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BRIGGS PROJECT

INYO COUNTY, CALIFORNIA

FINAL EIS/EIR - Volume II

Original Proposed Action and Alternatives Description and Analysis

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MAY 1995

Lead Agencies:

NEPA
U.S. Department of the Interior, Bureau of Land Management
California Desert District, Ridgecrest Resource Area
Ridgecrest, California

CEQA
County of Inyo Planning Department
Independence, California

Cooperating Agencies:

National Park Service, Death Valley National Park
Death Valley, California

U.S. Army Corps of Engineers
Ventura Regulatory Field Office
Ventura, California

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CHAPTER 1.0
INTRODUCTION

1.0 INTRODUCTION

1. This Draft Environmental Impact Statement/Environmental Impact Report (EIS/EIR) has been prepared in accordance with the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) for use by the U.S. Bureau of Land Management (BLM), County of Inyo (County), other responsible agencies, and the public, in consideration of applications to permit the construction and operation of a proposed open pit heap leach gold mining operation, known as the Briggs Project. The project proponent is CR Briggs Corporation, a subsidiary of Canyon Resources Corporation (collectively Canyon).

2. The Briggs Project would mine and process ore containing disseminated gold and minor amounts of silver. Ore is defined as mineralized material that can be mined at a profit. Using reasonable gold pricing and mining cost scenarios, the Briggs Project ore reserves are currently estimated at 21 million tons. Approximately 27 million tons of waste rock would also be excavated to access the ore. Canyon will continue to explore for additional reserves and the actual amount of reserves could go up or down depending on gold prices, the success of additional exploration efforts, actual mining and processing costs, and other factors.

3. Based on the current reserve estimate, the Briggs Project would excavate and process ore at an average rate of about 4 million tons per year over an operational period of about six years. Reclamation would occur concurrent with operations and following operations. With construction and reclamation, the total project life would be about seven to eight years. The Briggs Project would disturb up to 505 acres of desert land within the approximately 940-acre site.

4. The operational phase of the Briggs Project would provide about 130 direct jobs and, based on socioeconomic studies of the mining industry (Dobra, 1988), an estimated 160 indirect jobs. The average annual economic contribution of the Briggs Project would be about $23 million including payroll, goods and services purchased, and taxes.

5. Pending issuance of requisite permits and approvals, initial construction is scheduled to begin in late 1994 and last approximately six to eight months. With initial project operations overlapping construction as elements of the Briggs Project are completed, ore processing is scheduled to begin in early 1995.

1.1 PURPOSE AND NEED FOR THE PROPOSED ACTION

1. The Proposed Action referenced throughout this document is the construction, operation and reclamation of the Briggs Project gold mine as described in detail in Section 2.2 of this document, and the mitigation measures included by Canyon as part of the Proposed Action (i.e., mitigation measures incorporated by project design), as discussed in Chapter 4.0.

2. The purpose and need of the proposed project must be briefly specified in an EIS pursuant to 40 CFR 1502.13. The purpose ~~and need for~~ of the Proposed Action is to develop and operate a mine to recover gold from the Briggs Project ore deposit within the boundary of unpatented claims controlled by Canyon. Canyon's primary objective in this action is to recover the gold in a manner that is environmentally responsible, in compliance with applicable laws and regulations, optimizes gold recovery, and meets expected financial returns for corporate shareholders. The need is to meet market demand for gold. The BLM's primary objective in this action is to meet federal laws, regulations and policies related to development of mineral resources in an environmentally responsible manner. The BLM has, through land use plans, managed the subject lands under multiple use policy, allowing ~~unrestricted~~ access to mineral rights and mining, subject to Title 43 Code of Federal Regulations (CFR) 3809 requirements. The County's primary objective is to meet County General Plan policies to provide employment opportunities and facilitate other regional socioeconomic benefits of project development, in a manner that is environmentally responsible and consistent with other plan elements and the California Surface Mining and Reclamation Act (SMARA) codified at California Public Resources Code (PRC) Section 2710 et seq.

~~3. The proposed project is consistent with the General Mining Law. Under this law, qualified prospectors may search for mineral deposits on public domain lands open to mineral entry. Upon discovering a valuable mineral deposit, a prospector may locate a mining claim. A mining claimant is entitled to reasonable access to the claim for further prospecting, mining, or necessary related activities, subject to other laws and regulations. Because the proposed operations would be located on public lands administered by the BLM California Desert District, compliance with the California Desert Conservation Area (CDCA) Plan is required. United States mining laws and the CDCA Plan recognize the statutory right of mining claim holders to explore and/or develop mineral resources and encourage such activity consistent with the Federal Land Policy Management Act (FLPMA) and federal regulations (43 Code of Federal Regulations [CFR] 3809).~~

1.2 PROJECT LOCATION AND BACKGROUND

1. The Briggs Project site is located in Panamint Valley, Inyo County, California, approximately 34 miles northeast of Ridgecrest, as shown in Figures 1.1 and 1.2. The site is located on unpatented mining claims, on federal lands administered by the BLM, about eight miles southeast of Trona-Wildrose Road, at the mouth of Redlands Canyon on the western flank of the Panamint Range.

2. The project site occurs on parts of Sections 11, 12, 13 and 14 in Township 23 South, Range 44 East, Mount Diablo Base and Meridian. Offsite borrow for construction needs could occur on federal lands near the site either in part of Section 15 in Township 23 South, Range 44 East, or parts of Sections 4 and 9 in Township 22 South, Range 44 East.

3. Canyon acquired interest in the Briggs Project site in 1990. Since that time, Canyon has actively engaged in a program of exploratory drilling, metallurgical testing, and environmental studies. The studies indicate that the Proposed Action is technically, financially, and environmentally feasible.

4. In compliance with 43 CFR 3809, a Preliminary Plan of Operation and Reclamation (Canyon, 1992a) was submitted to BLM in August 1992 for full development of operations. This Plan of Operations was revised and resubmitted in November 1993 to incorporate up-to-date project and environmental information (Canyon, 1993b) and mitigation measures incorporated by project design. In November 1992, Canyon submitted an Application for Mining Reclamation Plan and *Application for Conditional Use Permit* (Canyon, 1992b; 1992c) to the County to meet the requirements of SMARA. Based on the decision that the environmental issues for the Proposed Action could be best addressed in a joint environmental document which could be used by both the BLM and County, it was determined that an EIS/EIR should be prepared.

1.3 NEPA AND CEQA PROCESS

1. Elements of the Proposed Action are subject to review and approval of federal, state and county agencies. Environmental review requirements of these agencies differ slightly, according to federal and state guidelines. To accommodate these differences, this document has been prepared as a joint EIS/EIR in accordance with provisions of NEPA (40 CFR ~~Part~~ Sections 1506.2 and 1506.4) and

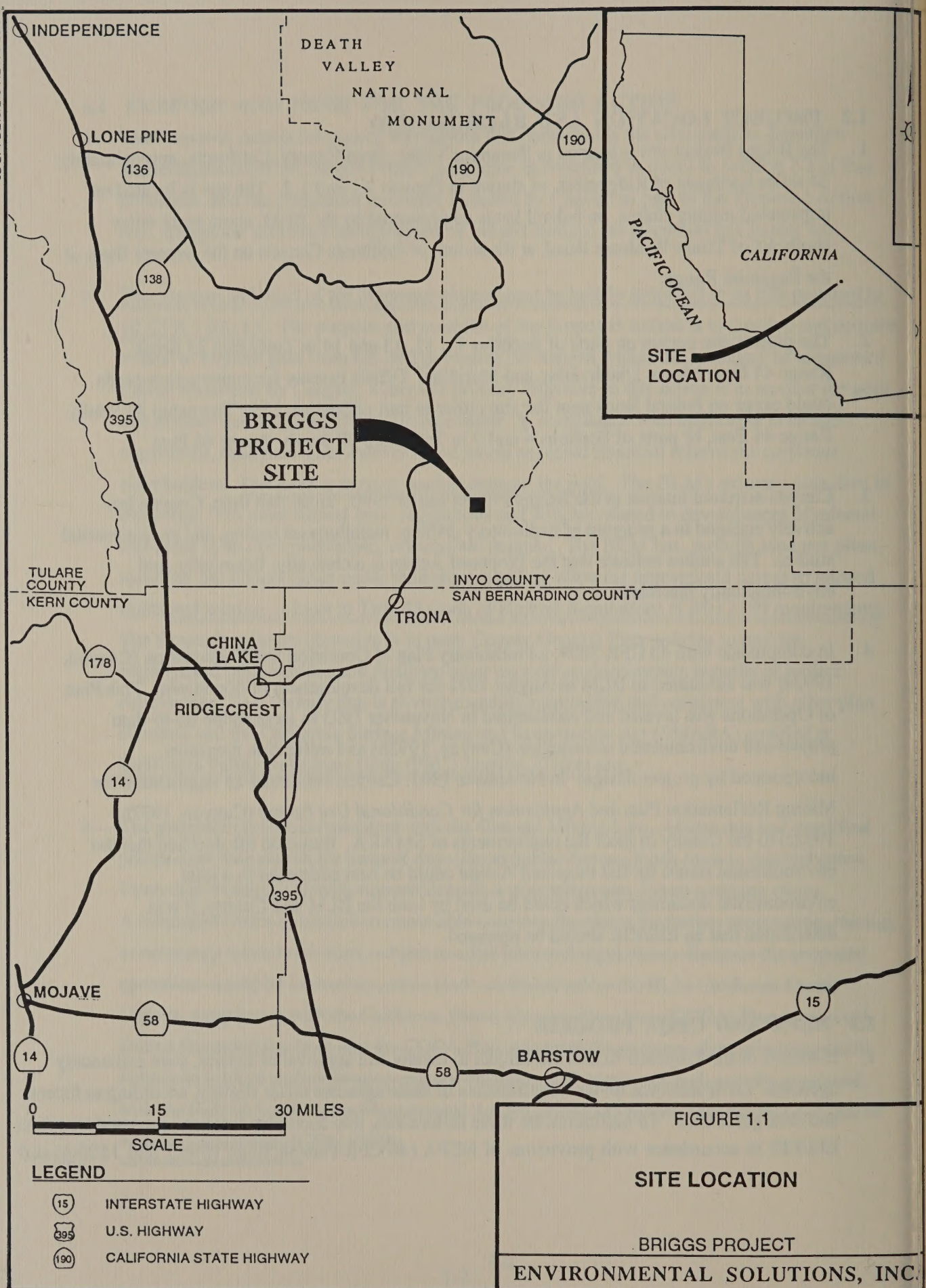


FIGURE 1.1

SITE LOCATION

BRIGGS PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

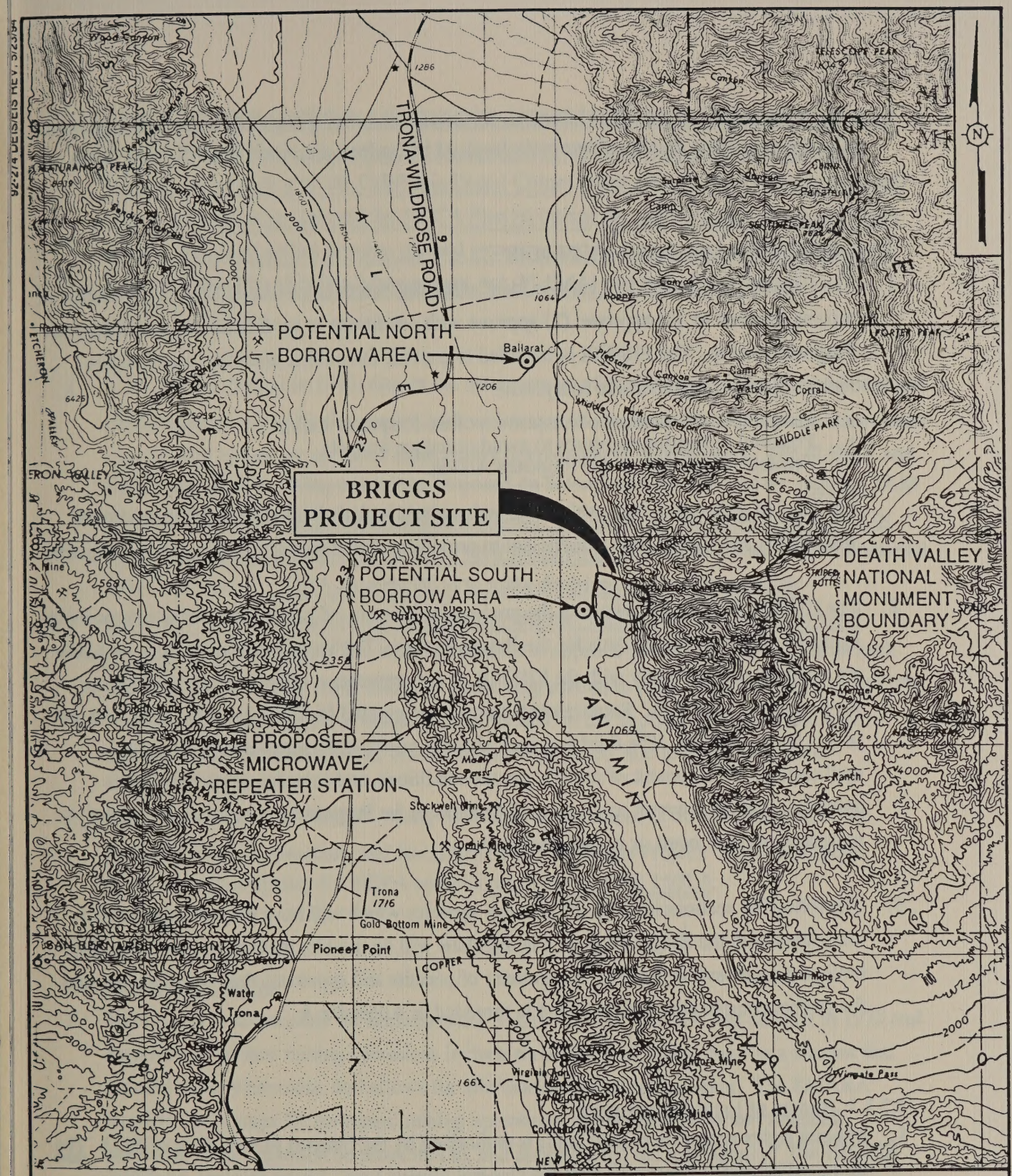


FIGURE 1.2

VICINITY MAP

BRIGGS PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

REFERENCE: USGS 1:250,000 TOPOGRAPHIC MAPS OF DEATH VALLEY, CA, DATED 1954 AND PHOTOREVISED 1970; AND TRONA, CA, DATED 1957 AND PHOTOREVISED 1969.

CEQA (Section 15226 of the *Guidelines for Implementation of the California Environmental Quality Act*). This document has been prepared in conformance with 40 CFR 1502 ~~Part 6~~.

1.3.1 INTENDED USES OF THE EIS/EIR

1. The EIS/EIR will be used by various local, state, and federal agencies in their consideration of actions required to: (1) approve; (2) approve with conditions or modifications; or (3) deny the Proposed Action. The EIS/EIR is intended to provide the public, agencies, and decision makers with a comprehensive analysis of:

   - Potential environmental consequences of the Proposed Action.
   - Potential mitigation measures to avoid or reduce impacts.
   - Feasible alternatives to the Proposed Action.

   The level of technical detail, evaluation, and analysis included in the EIS/EIR is consistent with NEPA and CEQA, and is sufficient to provide an understanding of the potential impacts.

2. The EIS/EIR is the initial phase of the process for issuance of various permits or approvals by agencies and governing boards for the Briggs Project. The second phase, portions of which are occurring concurrently with the EIS/EIR, is the preparation of appropriate applications for permits or approvals. Requirements that are anticipated for these permits are considered in this Draft EIS/EIR. The third and final phase is public and agency review of permit applications, development of specific permit conditions, and issuance of permits by the agencies. This phase may result in modifications to the Proposed Action to meet various regulatory requirements or permit conditions.

3. The following sections identify the primary agencies which will have discretionary actions associated with the Briggs Project. The EIS/EIR will be used by these agencies during their environmental review process. A summary of permits and approvals that would be required for project construction and operation is provided in Appendix A.

1.3.1.1 Bureau of Land Management

1. Mineral rights access on federal lands is authorized by the General Mining Law of 1872. The proposed project is consistent with the General Mining Law. Under this law, qualified prospectors may search for mineral deposits on public domain lands open to mineral entry. Upon discovering a valuable mineral deposit, a prospector may locate a mining claim. A mining claimant is entitled to reasonable access to the claim for further prospecting, mining,

or necessary related activities, subject to other laws and regulations. Because the proposed operations would be located on public lands administered by the BLM California Desert District, compliance with the California Desert Conservation Area (CDCA) Plan is required. United States mining laws and the CDCA Plan recognize the statutory right of mining claim holders to explore and/or develop mineral resources and encourage such activity consistent with the Federal Land Policy Management Act (FLPMA) and federal regulations (43 CFR 3809).

2. The FLPMA, passed in 1976, directs the management of public lands in the United States and defines specific procedural measures and environmental standards that mining operations must comply with to prevent undue or unnecessary degradation of federal lands. The FLPMA ~~and NEPA require that mining operations proposed on federal land be reviewed by~~ requires BLM to assure that mineral exploration and development operations do not cause unnecessary or undue degradation of federal lands under their jurisdiction. ~~appropriate levels of environmental protection are met~~. NEPA requires BLM to make decisions that are based on an understanding of environmental consequences and take actions that protect, restore and enhance the environment. The BLM is required to approve any operations as long as such activities will not cause unnecessary or undue degradation to public lands pursuant to 43 CFR 3809.0-5(k). BLM approval would be conditioned on the applicant's compliance with regulatory requirements of other federal and state agencies, and local governments.

~~2~~.3. The BLM will use the EIS/EIR, along with other information, in its consideration of the proposed Plan of Operations and Reclamation for the Briggs Project. For this purpose, BLM is the lead agency for NEPA compliance under 40 CFR 1501.5.

1.3.1.2 County of Inyo

1. The County is responsible for implementing SMARA. The SMARA was enacted in 1975 and requires that surface mining operations include reclamation of mined lands in a manner that protects the environment, and allows for alternate post-mining land uses. The SMARA requires that, except for exempted mining operations, reclamation plans and financial assurance for reclamation be submitted to, and approved by, the lead agency. The EIS/EIR will be used by the County along with other information, in their consideration of the Application for Mining Reclamation Plan. For this purpose the County's role is to determine whether the Briggs Project and reclamation plan fulfill the requirements of SMARA.

A favorable determination on the Application for Mining Reclamation Plan is required for the project to proceed.

2. The Briggs Project site is located on federal lands. If all or parts of the Briggs Project site transfer to private ownership ~~become patented~~ in the future, the County would exercise land use authority ~~on patented lands~~ under the County General Plan, and a Conditional Use Permit (CUP) would be required. This EIS/EIR is also intended to satisfy the County's CEQA responsibilities for determinations on the CUP application, if lands on the site transfer to private ownership ~~become patented~~.

3. For the purposes described in this section, the County is the lead agency for CEQA.

1.3.1.3 Other Agencies

1. Agencies responsible for the management of environmental resources such as air and water will also use the EIS/EIR to consider environmental effects of their discretionary actions. Additional key agencies include:
   - U.S. Army Corps of Engineers (COE)
   - Great Basin Unified Air Pollution Control District (APCD)
   - Regional Water Quality Control Board - Lahontan Region (RWQCB)
   - California Department of Fish and Game (DFG)

2. Applications to these agencies for requisite permits have been submitted or are in preparation. Applications submitted to date include:
   - *Briggs Project Application for a Section 404 Permit*, November 19, 1993, submitted to the COE (Canyon, 1993c).
   - *Briggs Project Authority to Construct Application*, May 20, 1993 (revised April 1994), submitted to the APCD (Air Sciences, Inc., 1994).
   - *Briggs Project Report of Waste Discharge*, November 1993, submitted to the RWQCB (WESTEC, Inc., 1993c).

   These applications are currently undergoing review by the respective agencies, and information contained therein has been considered in the preparation of this document.

3. Each of the above agencies have been consulted in the preparation of this document, and pertinent known requirements of these agencies have been considered in the environmental analyses in Chapter 4.0. The COE is participating in the NEPA process as a cooperating agency for this document. It is anticipated that, as responsible agencies under CEQA, the APCD, RWQCB and DFG will provide further guidance pertaining to their respective areas of jurisdiction, as necessary, as part of the public review process for this Draft EIS/EIR.

Additionally, any permits issued may contain mitigation measures in addition to those discussed in Chapter 4.0, as deemed necessary by those agencies for protection of those resources over which they have jurisdiction. These additional mitigation measures would be coordinated with the County or BLM to eliminate or reduce potential conflicts.

4. National Park Service - Death Valley National Monument (NPS) is also participating as a federal cooperating agency due to Death Valley National Monument's (DVNM's) proximity to the Briggs Project site (Figure 1.1). The purpose of this cooperation is to assure that NPS input is facilitated to minimize project impacts on DVNM. The Briggs Project would not require permits or approvals under NPS jurisdiction.

1.3.2 BRIGGS PROJECT EIS/EIR PROCESS

1. The following briefly summarizes the EIS/EIR process as it relates to the proposed Briggs Project site:

   - **Notice of Intent and Notice of Preparation** - Public notification to prepare an EIS/EIR is provided so that the public and interested agencies can participate in the CEQA and NEPA processes, if desired, through comments during the scoping and public review periods. The BLM's Notice of Intent was published in the Federal Register on December 18, 1992. The County's Notice of Preparation was distributed to potentially interested agencies and individuals by the County on December 23, 1992. Copies of these documents are included in Appendix B.
   - **Public Scoping Meetings** - Public scoping meetings were held on January 12 and 13, 1993, to provide an opportunity for the public and agencies to submit verbal statements on issues to be addressed in the EIS/EIR. The notifications of the meetings included: (1) notice to regional and local media sources; and (2) direct mailing of an announcement by BLM. Those not able to attend were invited to submit written comments through the published notifications.

     As a result of the scoping process, the primary issues of public and governmental concern were identified. These are summarized in Table 1.1. Copies of public scoping notifications and comments received are included in Appendix B.
   - **Preparation of the Draft EIS/EIR** - The Draft EIS/EIR was prepared to identify, describe, and analyze the environmental issues of the Proposed Action and alternatives.
   - **Notice of Completion and Federal Register Publication Notice** - The availability of the Draft EIS/EIR was noticed by the County with a Notice of Completion sent to the California Office of Planning and Research. BLM noticed the document through the U.S. Environmental Protection Agency (EPA) in the Federal Register. Direct mailings of the document's availability were made to those on the project mailing list.

TABLE 1.1

PUBLIC AND AGENCY SCOPING SUMMARY OF ISSUES

TOPIC[1]	NUMBER OF COMMENTERS	
	Written[2]	Verbal[3]
ANIMAL LIFE • Changes to onsite habitat and species distribution. • Potential impacts to unique, threatened, or endangered species, and species of special concern. • Potential for effects from operations and exposure to process reagents. • Habitat fragmentation. • Effects of noise and light.	14	2
WATER • Changes in surface flows and ground water. • Stormwater management. • Potential for accidental discharge. • Potential for water quality degradation.	12	3
PLANT LIFE • Changes in species and vegetation distribution. • Potential impacts to unique, threatened, or endangered species. • Potential for introduction of exotic species.	9	3
AESTHETICS • Changes to the site's aesthetic characteristics and its effect on the viewshed. • Effect on Manly Fall.	6	1
SOCIOECONOMIC BENEFITS • Economic benefits to local communities. • Employment opportunities. • Social benefits of mineral commodity mined.	3	3
RECLAMATION AND BONDING	6	0
AIR • Increases in particulates, and generation of hydrocarbon and other emissions.	5	0
LAND USE, RECREATION AND WILDERNESS • Impacts to surrounding Wilderness Study Areas and DVNM. • Impacts to wilderness and Death Valley National Park, as proposed under the Desert Protection Act. • Impacts to recreation due to access limitations.	5	0
PUBLIC SERVICES • Effects of population growth on schools, parks, and other recreational facilities. • Road maintenance and other governmental services. • Economic impacts.	4	0

(1) Order reflects number of comments received.
(2) Comment letters are provided in Appendix B.
(3) Comments received at scoping meetings and via telephone contacts to BLM or the County.

TABLE 1.1

PUBLIC AND AGENCY SCOPING SUMMARY OF ISSUES (Continued)

TOPIC[1]	NUMBER OF COMMENTERS	
	Written[2]	Verbal[3]
SOILS AND GEOLOGY • Changes to topography and soils. • Changes to stream configuration and erosion. • Potential for earth shaking/ground rupture/liquefaction.	2	0
WASTE GENERATION • Nonhazardous and hazardous wastes. • Sewage disposal.	2	0
LIGHT AND GLARE • Introduction of new light and its effects on recreation, and on military aviation.	2	0
CULTURAL RESOURCES • Potential impacts to historic, prehistoric and archaeological resources.	2	0
CUMULATIVE EFFECTS	2	0
RISK OF UPSET/HUMAN HEALTH • Measures to properly store and handle fuels, oils, and other hazardous materials. • Generation and control of particulate and other emissions.	1	0
NOISE • Noise exposure and effects on recreational uses.	1	0
TRANSPORTATION/CIRCULATION • Increases in traffic levels and the need for local improvements.	1	0
OTHER • Gold recovery. • Availability of site records for public inspection. • CEQA/NEPA procedures.	3	0
POPULATION AND HOUSING • Population and housing changes in Trona and Ridgecrest.	0	0

92-274 (7/11/94/cm)

(1) Order reflects number of comments received.
(2) Comment letters are provided in Appendix B.
(3) Comments received at scoping meetings and via telephone contacts to BLM or the County.

- **Public Release of the Draft EIS/EIR for Review and Comment** - This Draft EIS/EIR has been released for a 60-day review to the public, including interested individuals, groups, government representatives, and agencies.
- **Preparation of the Final EIS/EIR** - A Final EIS/EIR will be prepared. It will incorporate and respond to all comments received as a result of the public review of the Draft EIS/EIR.
- **Record of Decision and Notice of Determination** - After publication and circulation of the Final EIS/EIR and a 30-day waiting period, BLM will make its decision regarding the Proposed Action, prepare a public record statement on its decision, and publish the decision in the Federal Register. The County will hold a public hearing to certify the adequacy of the EIS/EIR, make its decision regarding the Proposed Action, prepare and publish a record of decision, and file a Notice of Determination.

1.4 OTHER LAWS FOR ENVIRONMENTAL PROTECTION

1. This section summarizes the legislative and regulatory framework which, in addition to NEPA and CEQA guidelines, would be addressed as part of the Briggs Project. Various aspects of the Briggs Project must be in compliance with applicable federal and state environmental requirements. Numerous different acts, codes, rules and regulations have been identified. Key aspects of this regulatory framework are summarized for each environmental issue in Chapter 4.0.

1.4.1 AIR QUALITY

1. Construction and operation of the Briggs Project would be subject to federal, state and local rules and regulations, as implemented through provisions of the Clean Air Act of 1971, pertaining to the control of air pollutants emitted into the atmosphere. Region IX of the EPA has federal jurisdiction over the area, and the California Air Resources Board (CARB) is responsible at the state level. At the local level, the APCD has authority over sources of air pollutants. CARB serves as technical review and advisory agency, providing technical advice to APCD when necessary, and offering guidance when APCD regulations are not sufficiently detailed to address a particular situation.

2. The APCD has fulfilled federal requirements that allow a local agency to administer federal Clean Air Act policies. Thus, APCD will have primary regulatory authority over potential sources of air pollution associated with the Briggs Project.

1.4.1.1 Clean Air Act

1. The Clean Air Act was established in an effort to ensure that minimum levels of air quality are maintained in all areas of the United States. These minimum levels are termed National Ambient Air Quality Standards (NAAQS). The NAAQS are legal limits on the allowable ambient levels of air pollution. Pollutants for which NAAQS have been established are nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO), suspended particulate matter less than 10 microns in aerodynamic diameter (PM_{10}), and ozone (O_3). These are often termed "criteria pollutants."

2. There are primary and secondary NAAQS. The primary standards are intended to reflect levels of air quality deemed necessary to protect the public health, incorporating an adequate margin of safety. The secondary standards reflect the levels of air quality necessary to protect public welfare from any other known or anticipated adverse effects of a pollutant (e.g., effects to wildlife or visibility). Most areas of the ~~country~~ United States were required to attain the primary standards no later than December 31, 1982, with conditional extensions to 1987 granted to certain problem areas.

3. Under the Clean Air Act, state and local authorities were given primary responsibility for assuring that their respective regions were in attainment of the NAAQS or had a verifiable Attainment Plan to achieve them. This provision also gave state and local agencies authority to promulgate more stringent ambient air quality standards. In California, CARB has promulgated its own set of California Ambient Air Quality Standards (CAAQS). There is no deadline for attainment of the CAAQS. However, the air quality Attainment Plan must allow for a 5 percent reduction in annual O_3, CO and NO_2 emissions in nonattainment areas, until the state standards for these pollutants are achieved. Since Inyo County is in attainment for these pollutants, the 5 percent reduction per year is not required. ~~The APCD has not adopted any ambient air quality standards more stringent than the CAAQS.~~

4. The Briggs Project site is located in an area that is in attainment or unclassified (due to a lack of data) for all NAAQS and all CAAQS except the state 24-hour PM_{10} standard.

1.4.1.2 APCD Rules and Regulations

1. The APCD is empowered to regulate stationary sources of air pollutant emissions in such a manner that the region within its jurisdiction either attains, or is projected to attain, the NAAQS

for all criteria pollutants. Should it become clear that any part of the region is moving away from attainment of the standards, APCD will implement corrective measures to bring the region back into attainment. These could include measures such as lowering net emissions, and creating more stringent air pollution control regulations. In certain instances, these regulations could be retroactive and require existing emission sources to conform to the new regulations.

2. Emissions from sources of any contaminant for which there is a NAAQS are governed by APCD rules and regulations. These rules and regulations include New Source Review as part of a permitting process whereby new or modified sources of emissions are evaluated for adequate controls and compliance with federal, state and local regulations.

1.4.2 WATER QUALITY

1.4.2.1 Clean Water Act

1. The Clean Water Act regulates discharges to surface waters from all types of sources. Discharge to surface water is subject to the requirements of a National Pollutant Discharge Elimination System (NPDES) permit, which ensures that the water meets applicable standards at the point of discharge. The NPDES provisions are contained in Section 402 of the Clean Water Act. In California, control of surface water discharges in accordance with the Clean Water Act is delegated by EPA to the State Water Resources Control Board (SWRCB) and, ultimately the RWQCB.

2. Section 404 of the Clean Water Act regulates discharge of dredged or fill material into waters of the United States. Permitting of these types of discharges occurs under the authority of the COE. The definition of "waters of the United States" is included in 33 CFR 328.3 which, in part, states that they include "...lakes, rivers, streams [including intermittent streams], mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce..."

1.4.2.2 Federal Safe Drinking Water Act

1. The federal Safe Drinking Water Act establishes minimum national drinking water standards and guidelines for protecting ground water. Both primary and secondary standards are specified for drinking water. Primary standards are established for the protection of human health and set Maximum Contaminant Levels (MCLs) for a variety of inorganic and organic

substances. Secondary standards are intended as guidelines and are not federally enforceable. They are established primarily for aesthetic purposes such as color and taste.

2. The federal Safe Drinking Water Act is enforced at the state and local level by the SWRCB and RWQCB, through water quality protection regulations, and by the California Department of Health Services (DHS) and the County Department of Environmental Health Services (DEHS) through regulation of drinking water systems.

1.4.2.3 California Water Code

1. The state enforces federal water quality protection programs for which they have been delegated authority under the California Water Code and implementing regulations. The Porter-Cologne Water Quality Control Act (Water Code Sections 13000 to 14076) provided a comprehensive statewide system for water pollution control that included designation of the SWRCB and nine RWQCBs, covering the entire state. Local jurisdiction over water quality is also provided. Under the Porter-Cologne Act, the SWRCB is responsible for adopting water quality standards as required to fulfill the state's responsibilities under the federal Clean Water Act. In addition to surface water discharge permitting requirements of the Clean Water Act, the Porter-Cologne Act regulates discharges and potential discharges to ground water.

2. Any person proposing to discharge waste that could affect the quality of waters of the state must file a Report of Waste Discharge with the RWQCB. The RWQCB may permit discharges that comply with the Clean Water Act and the Porter-Cologne Act, subject to issuance of waste discharge requirements to protect the quality of waters of the state. Standards more stringent than required under these laws may be required in waste discharge requirements if needed to implement water quality control plans and to protect beneficial water uses.

3. The RWQCBs regulate water resources under federal and state antidegradation policies (40 CFR Section 131.12 and SWRCB Resolution 68-16), regional water quality control plans, and other applicable policies and regulations. The project site is located in the area encompassed by the South Lahontan Basin Water Quality Control Plan, which was adopted in 1975 and amended several times. Designated beneficial uses of water in the Panamint Valley are identified in this plan and are further discussed in Section 3.3.

1.4.2.4 ~~1.4.2.3~~ California Code of Regulations ~~for Mining Facilities~~, Title 23

1. The SWRCB, and ultimately the RWQCB, regulate systems or activities that have the potential to discharge contaminants to surface or ground waters. The review and permitting process for mining facilities follow requirements of California Code of Regulations (CCR) Title 23, Subchapter 15, Article 7 (Mining Waste Management). Article 7 also provides the RWQCB with the authority for adoption of waste discharge requirements to protect the waters of the state from contamination.

1.4.2.5 ~~1.4.2.4~~ Resource Conservation and Recovery Act

1. The Resource Conservation and Recovery Act (RCRA) of 1976 requires federal and state agencies to promulgate regulations implementing standards for handling hazardous waste materials. Regulations applicable to generators of hazardous waste are included in 40 CFR Parts 260, 261, 262 and 266. California is authorized to implement a hazardous waste program that, at a minimum, must be at least as stringent as the federal standards. State hazardous waste standards are included in CCR Title 22, which is administered by the California Department of Toxic Substances Control (DTSC).

1.4.3 ~~ENDANGERED SPECIES~~ BIOLOGICAL RESOURCES

1.4.3.1 Federal Endangered Species Act

1. The federal Endangered Species Act (ESA) of 1973, as amended, extends legal protection to plants and animals listed as endangered or threatened by the U.S. Fish and Wildlife Service (FWS). The ESA authorizes FWS to review proposed federal actions to assess potential impacts to "listed" species.

2. Listed species are those which are threatened or endangered (in danger of extinction throughout all or a significant portion of their range) and which have been the subject of final regulation and listing in the Federal Register, and those species officially proposed for listing in a Federal Register Notice.

3. In addition to listed species, a second group is identified under ESA. This group, known as "candidate" species, are those which are not yet the subject of a proposed or final ruling to

become listed. Two categories of candidate species and one category of non-candidate species are recognized:

- Category 1 - Candidate species for which there is adequate information to support the appropriateness of proposing to list as threatened or endangered.
- Category 2 - Candidate species for which there is information that indicates that proposing to list as threatened or endangered is possibly appropriate, but substantial data on vulnerability and threat are not currently known.
- Category 3 - Species that are no longer under consideration for listing.

4. Section 7, the interagency portion of the ESA, requires federal agencies, in consultation with the FWS, to ensure "that any action authorized, funded, or carried out by such agency...is not likely to jeopardize the continued existence of any listed species or result in the destruction or modification of [critical] habitat."

1.4.3.2 California Endangered Species Act and Native Plant Protection Act

1. The California Endangered Species Act (CESA) of 1984 and the Native Plant Protection Act of 1977 (NPPA) are administered by the DFG. In addition to rare and endangered species, the State of California designates candidate species for plants and wildlife. Candidate species are those that have been accepted by the state for review and potential inclusion to the list of rare, threatened, or endangered species. The rare designation applies to plants only and includes those plants that are not threatened or endangered, but could be eligible due to decreasing numbers or further restrictions to habitat. Maintaining priority within the various lists in the function of the California Natural Diversity Data Base (CNDDB), which is also maintained by DFG.

2. Section 15065 of the CEQA guidelines specifies that "A Lead Agency shall find that a project may have a significant effect on the environment and thereby require an EIR to be prepared..." if the project has "...the potential to reduce the number or restrict the range of a rare or endangered plant or animal..." ~~This section has been construed not only to include species designated as rare, threatened or endangered under the CESA, but also other sensitive species and species of special concern as identified by the DFG as a Responsible Agency under CEQA~~. Appendix G of the CEQA implementing guidelines indicates that "A project will normally have a significant effect on the environment if it will substantially effect a rare or endangered species of animal or plant or the habitat of the species." These concepts are utilized in the vegetation and wildlife impacts significance criteria presented in Chapter 4.0.

3. Section 15380(b) of the CEQA Guidelines states that "[a] species of animal or plant is:

(1) 'Endangered' when its survival and reproduction in the wild are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, over exploitation, predation, competition, disease, or other factors; or

(2) 'Rare' when either:

(A) Although not presently threatened with extinction, the species is existing in such small numbers throughout all or a significant portion of its range that it may become endangered if its environment worsens; or

(B) The species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range and may be considered 'threatened' as that term is used in the Federal Endangered Species Act."

Section 15380(d) of the Guidelines states that a species not listed as endangered, threatened or rare in CCR Title 14 (Sections 670.2 or 670.5) or CFR Title 50 (Sections 17.11 or 17.12) "shall nevertheless be considered to be rare or endangered if the species can be shown to meet the criteria in subsection (b)."

1.4.3.3 BLM Sensitive Species List

1. Sensitive plant and wildlife species are designated by BLM's California State Director and must meet one or more of the following criteria:

- Species identified as candidates for listing as endangered or threatened by FWS in a Federal Register Notice of Review.
- Species that have been officially proposed for listing as endangered or threatened by the FWS in a Federal Register Notice of Review.
- Species that do not meet either of the above criteria, but have been designated as sensitive by the State Director, based in part on information from the CNDDB and private groups such as the California Native Plant Society (CNPS).

The purpose of the designation is to provide increased management attention to prevent population and habitat declines that might result in federal or state listing as endangered or threatened. No particular habitat population management action is required or prohibited by the "sensitive" species designation.

1.4.3.4 Federal Migratory Bird Treaty Act

1. The Migratory Bird Treaty Act (16 USC 701-718h) makes no provision for the killing of migratory birds without a permit. All birds are considered migratory birds under the Migratory Bird Treaty Act with the exception of three: English sparrow (*Passer domesticus*), starlings (*Sturnus vulgaris*), and barnyard pigeons (*Columba livia*). A zero mortality objective regarding wildlife shall be maintained. Migratory bird deaths associated with cyanide heap leaching processes would come under the jurisdiction of this statute. Any mining operation which repeatedly or negligently fails to prevent migratory bird mortality could be federally prosecuted.

1.4.4 CULTURAL RESOURCES

1.4.4.1 National Historic Preservation Act (Section 106)

1. The National Historic Preservation Act (NHPA) of 1966, as amended, established: (1) a National Register of Historic Places (NRHP) to be maintained by the Secretary of the Interior; (2) the position of State Historic Preservation Officer (SHPO); and (3) the Advisory Council on Historic Preservation (ACHP). Section 106 of the NHPA requires federal agencies to provide the SHPO and ACHP an opportunity to comment on any project on federal lands within their state that would affect properties included in or eligible for inclusion in the NRHP. Section 304 directs federal agencies to withhold from disclosure to the public information relating to the location or character of eligible properties whenever disclosure of such information may create risk or harm to such resources. NRHP eligibility criteria are specified in 36 CFR Part 60.4 and discussed further in Section 3.9.2.2.

2. The advisory council regulations outline procedures to be followed by federal agencies (51 Federal Register, 31118; 9/2/86). Federal agencies are required to consult with the SHPO to determine if a proposed undertaking encompasses any property included in or eligible for inclusion in the NHRP. For each eligible property identified, the federal agency must determine if the proposed undertaking would have an effect. If there could be an effect, the Criteria of Adverse Effect are applied, and treatment measures are developed for resources that would be adversely affected. The regulations provide for consultation with the SHPO and ACHP to develop conditions for a Memorandum of Agreement for mitigation of potential adverse effects.

3. Within the statutory constraints (NHPA Section 304 and Archaeological Resources Protection Act of 1979, Section 9), the advisory council regulations encourage participation by local

governments, Native American tribes, and the public. Within this context, comments on the Briggs Project are sought from the County, the Native American Heritage Commission, the local Native Americans, archaeologists, historian, and other groups or individuals concerned with cultural resources.

1.4.4.2 CEQA Archaeological Guidance

1. CEQA Guidelines, Appendix K, Archaeological Impacts, provide guidance for the identification, evaluation, and mitigation of archaeological properties that may be affected by a proposed project. Additionally, Appendix K contains detailed procedures for determining the significance, or lack thereof, of a proposed project on a cultural resource. Only impacts on "unique" or "important" cultural resources can be considered significant in terms of the potential effects of a proposed project (PRC Section 21083.2). The terms "unique" and "important" are interchangeable when referring to cultural resources within a proposed project area under CEQA review. PRC Section 21083.2 uses the term "unique," while CEQA Guidelines, Appendix K, use the term "important."

2. CEQA and NHPA contain parallel provisions for the identification and management of cultural resources. CEQA specifically provides that treatment of cultural resources following federal guidelines may be used when a federal action is part of project approval (CEQA Guidelines, Appendix K, Section VI). Because the proposed project includes federal actions, the significan of cultural resources discussed in this EIS/EIR was evaluated using federal guidelines.

1.4.4.2.3 American Indian Religious Freedom Act

1. The American Indian Religious Freedom Act of 1978 resolves that it shall be the policy of the United States to protect and preserve for the American Indians, their inherent right of freedom to believe, express, and exercise their traditional religions.

1.4.5 LAND MANAGEMENT

1.4.5.1 California Desert Conservation Area Plan

1. Section 601 of FLPMA required that BLM develop a plan to "provide for the immediate and future protection and administration of the public lands in the California desert within the framework of a program of multiple use and sustained yield, and the maintenance of environmental quality." In accordance with the FLPMA, the CDCA Plan was developed for

management of the public lands of the California desert by BLM. Approximately 12.1 million acres of federal lands are administered by the BLM under the CDCA Plan. The CDCA encompasses the Mojave, Sonoran, and Great Basin deserts located in southeastern California, including the Briggs Project site. The main purpose of the CDCA Plan is to protect and enhance the desert environment, while providing for the use of public lands within a multiple-use framework.

1.4.5.2 Wilderness Study Areas

1. In Section 603 of FLPMA, Congress directed the BLM nationwide to: (1) survey its lands and determine which lands have potential for wilderness; (2) study these areas; and (3) make recommendations to Congress about which areas would be suitable to include in the National Wilderness Preservation System. Within the CDCA, 137 areas, covering 5.7 million acres, were designated as Wilderness Study Areas (WSAs) exhibiting basic wilderness requirements and meriting study. Two of these areas, the Manly Peak WSA (WSA 137) and Slate Range WSA (WSA 142) bound the project site. The site occurs in a "window" that was excluded from WSA status because of historic mining disturbances. A third WSA, Middle Park (WSA 137A) occurs about 3.5 miles north of the project site. Locations of these WSAs, and other WSAs in the Panamint Valley, are further discussed in Section 3.7.

2. In 1990, BLM submitted recommended wilderness areas to Congress based on their studies of the WSAs. These recommendations did not include the Middle Park or Manly Peak WSAs. BLM determined that while these areas were of national wilderness quality, the mineral values were more significant. BLM did recommend a portion of the Slate Range WSA located about five miles from the project site for wilderness designation.

3. Although mining activities are not precluded from WSAs, all surface-disturbing activities must meet nonimpairment criteria, and at a minimum be capable of being reclaimed to a condition of being substantially unnoticeable.

1.4.5.3 Proposed California Desert Protection Act

1. California wilderness bills are currently being sponsored in Congress, which would designate wilderness areas. The bills (S.21 and H.R. 518), which are referred to as the Desert Protection Act (DPA) would designate 69 BLM wilderness areas and several WSAs in the California desert, that together would comprise nearly 4 million acres.

CHAPTER 2.0
DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.1 INTRODUCTION

2.1.1 GENERAL

1. In accordance with 40 CFR 1502.14 and 14 CCR 15124, ~~T~~this chapter describes the facilities and activities proposed for the Briggs Project. Most of the major components of the project, including the mine pit, clay borrow site, heap leach pad, and waste rock piles would be developed gradually or in phases over the approximately six- to eight-month period of initial construction and the estimated six years of mine operations. Development over this period would be managed to optimize resources and activities based on operational and market conditions, and to minimize adverse environmental impacts consistent with good mining practices.

2. The Proposed Action described in this chapter is based on preliminary engineering conducted to date, which has been completed to allow the environmental analysis to be performed and to support applications to agencies for key project permits. The full scope of any activities that could vary substantially (e.g., maximum mine pit size) is addressed herein so that the description is complete for the purposes of assessing potential environmental impacts. Because it is the intent of the environmental analysis to determine project effects that relate to a physical change in the environment, the description of the project focuses on aspects that would result in such change. Impacts such as beneficial fiscal effects from employment and taxes (raised during the public scoping process) and other such aspects of the project that do not have a clear environmental impact are not discussed in detail. Consistent with the intended use of this document and in accordance with NEPA and CEQA requirements, the project description in this chapter is focused differently than project descriptions that may be found elsewhere, for example, in applications for permits specific to management of a particular set of environmental resources.

3. There is some potential that changes to the Briggs Project as described in this chapter could occur during permitting or operations to accommodate:
   - Environmental mitigation requirements.
   - Permitting agency design requirements.
   - Additional exploration drilling data that could change the gold reserves.
   - Actual ore properties (e.g., physical properties or metallurgy) which may require modifications to design or operational procedures.
   - Onsite operating experience which would allow for optimization of procedures.
   - Improved mining technology.
   - Economic conditions.

If new information necessitates changes from the project described in this document that are substantive to the environmental analysis, implementation of those changes would require: (1) supplementary evaluation of potential environmental impacts; and (2) determination as to whether the changes would be consistent with the analyses in this report or whether they would require additional environmental analysis.

4. ~~Mining is commonly recognized as an interim land use.~~ Reclamation of mined land is an integral part of modern mine planning. ~~mining to provide for environmental protection and alternate land uses at the conclusion of mining~~. Although some ore bodies may be mined for tens of years (in some cases intermittently as resource prices fluctuate), as required by state and federal law, the site must eventually be reclaimed. The goals of reclamation are to lessen adverse impacts of the mineral extraction process on the ~~physical~~ environment, and to return the mined land to a usable condition which is readily adaptable for alternative land uses. The Briggs Project, therefore, includes both a mine plan and a reclamation plan that are proposed and evaluated together. A description of the key reclamation plan objectives and tasks is provided in this chapter to be evaluated together with the mine plan in this Draft EIS/EIR.

5. Also described and evaluated in this chapter, in accordance with the requirements of NEPA and CEQA, is a range of potential alternatives to the Proposed Action. Alternatives that could feasibly attain most of the basic objectives of the project are described and evaluated.

~~6. Canyon's proposed activities include strict adherence to their written environmental protection policy throughout all phases of the project, including reclamation. This policy (Canyon, undated), in part, states that "...Canyon and its management and employees will:~~

- ~~Maintain full compliance with all applicable federal, state and local environmental laws, rules, regulations and standards;~~
- ~~Conduct its operations in a manner that will control, minimize or mitigate harm to the environment including air, water and soils by applying proven technology and appropriate operating practices, taking into account economic and environmental factors;~~
- ~~Monitor Canyon's ability to minimize or eliminate adverse environmental impacts of its activities; ..."~~

~~BLM and the County would require Canyon's adherence to this policy so that impacts to environmental resources including air, land, water and aesthetic values are minimized, and the naturalness and wilderness values of the surrounding area are preserved.~~

~~7.~~ 6. ~~Consistent with their environmental protection policy,~~ Canyon has incorporated an offsite environmental mitigation plan into the Proposed Action that would offset ~~compensate, both in quantity and quality, for~~ onsite disturbances that would not be revegetated as part of reclamation. This is in addition to and not a substitute for required onsite reclamation. Details of Canyon's proposed offsite mitigation measures are discussed in Section 2.2.4.

2.1.2 OVERVIEW OF THE PROPOSED MINING ACTIVITIES

1. The process that would be used to recover gold from ore at the Briggs Project is depicted in Figure 2.1. The following paragraphs provide an overview of the mining and ore processing operation. A detailed description is provided in Section 2.2. The generalized process characterized below would be applicable to both the Proposed Action and feasible alternatives.

2. The Briggs ore body occurs as zones of metamorphic rock containing minute particles of gold and smaller amounts of silver surrounded by unmineralized (i.e., non gold-bearing) rock that must be excavated to access and extract the ore. The unmineralized rock that must be excavated is referred to as waste rock.

3. The mining cycle would begin with drilling of blast holes in a grid pattern, and analyzing samples of drill cuttings to define ore and waste rock boundaries. The blast holes would be charged with explosives and, after necessary safety precautions are taken, the explosives would be detonated to break up the rock. Drilling and blasting would occur over a small area at a time (e.g., up to a few acres). The rock would be excavated and loaded into large dump trucks using heavy-duty loaders or hydraulic shovels. Ore and waste rock would be loaded separately. Blasting and excavation would move progressively over the area to be mined, exposing a new layer of unblasted rock and the cycle would repeat. Through this process, the pit would be excavated in sequential downward layers.

4. Waste rock from the mine pit would be hauled to piles located adjacent to the mine pit. Ore would be hauled to a crusher or to a crusher feed stockpile. Water trucks would be used to periodically spray excavation areas and haul roads to reduce the generation of dust.

5. The crusher circuit would consist of a series of conveyors, crushers, and particle size classifiers to break the ore into gravel-sized particles so the gold can be effectively removed. Water sprays would be used in the crushing and conveying circuit to control dust emissions.

Lime would be added as necessary to control the ore pH for leaching and to cement small particles of ore together so that percolation of leaching solution is not inhibited. From the crusher circuit, the ore would be loaded onto a leach pad, which is a lined area designed to contain processing solution for leaching the gold from the ore.

6. On the heap leach pad, a dilute cyanide solution would be distributed across the top of the ore using an irrigation system. The solution percolating downward through the material would dissolve the gold (and silver) in the ore. The pregnant (gold-bearing) solution would drain across the top of the impervious pad liner and would flow to the edge of the pad and then via pipes to a lined solution pond, referred to as the pregnant solution pond.

7. Solution from the pregnant pond would be pumped through pipes to a carbon adsorption and gold recovery plant, where the gold and silver adsorb (attach) onto activated carbon in tanks. After the gold has been adsorbed onto the carbon, the residual barren solution would be pumped to a storage pond, called the barren solution pond, to be reused on the heap. In the gold recovery circuit, the gold-bearing carbon would be chemically treated (or stripped) to release the gold. The gold-bearing strip solution would be pumped to an electrowinning cell, where the gold would electrically plate to a surface of steel wool. The electroplated gold would be melted in a furnace, and a doré (or impure bar of gold and silver) produced. The doré would be sold or shipped to a refinery.

2.1.3 MINE RECLAMATION

1. Reclamation is an integral part of the mining process. Reclamation is intended to provide for future mining, if appropriate, as well as other land uses such as recreation, wildlife management, range and forage, while giving consideration to aesthetics and public health and safety.

2. Federal policy encourages the development of federal mineral resources and reclamation of disturbed lands, consistent with the FLPMA and the Mining and Mineral Policy Act of 1970. Under the mining laws, a person (or company) has a statutory right, consistent with Department of Interior regulations, to use federal lands for the purpose of mineral prospecting, exploration, development, extraction, and other associated reasonable uses. These regulations also state that, "this statutory right carries with it the responsibility to assure that operations include adequate and responsible measures to prevent unnecessary or undue degradation of the federal lands and to provide for reasonable reclamation" (43 CFR 3809.0-6).

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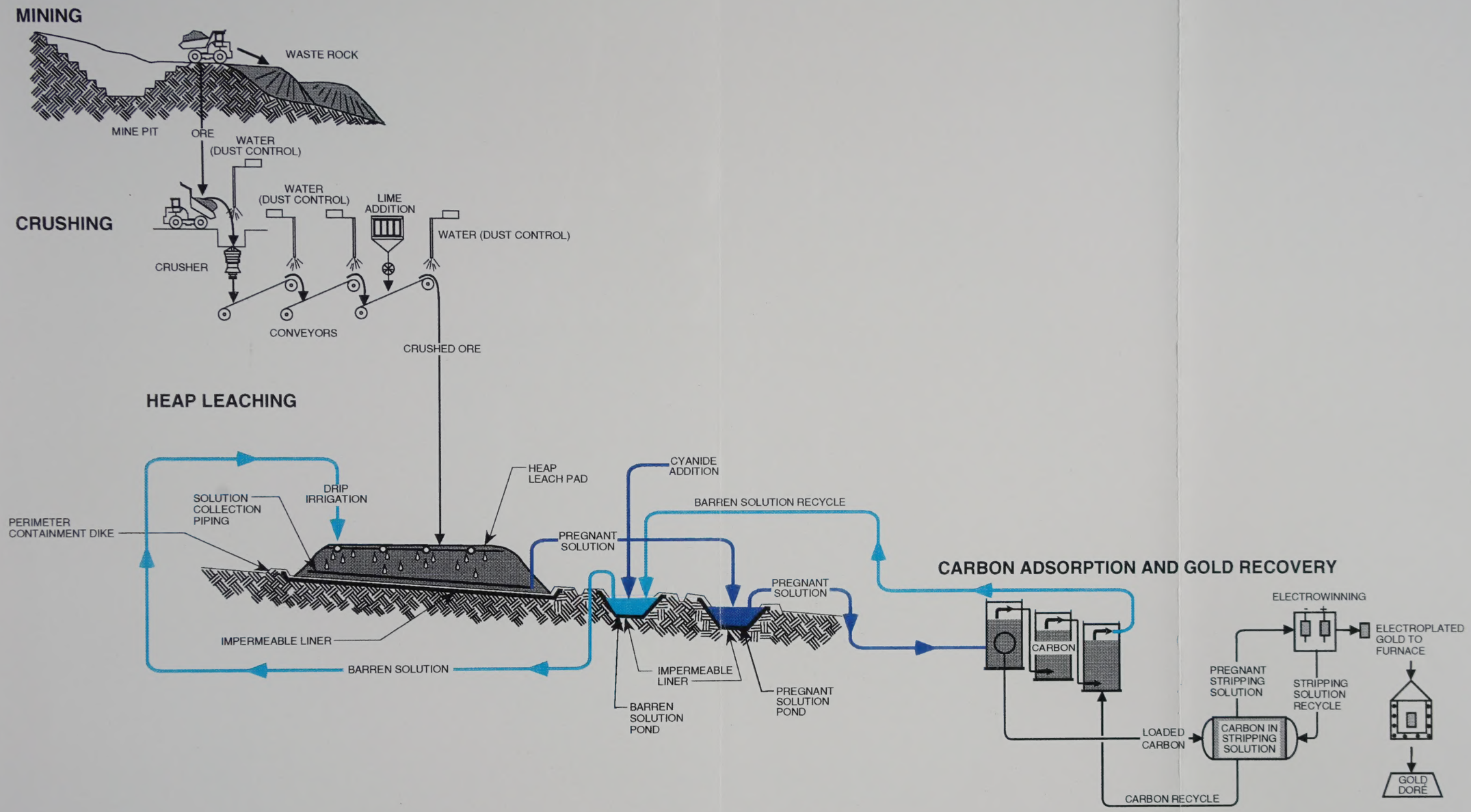


FIGURE 2.1

SCHEMATIC MINE OPERATION FLOW DIAGRAM

BRIGGS PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

3. The 43 CFR 3809 regulations define standards for reclamation of mining activities on federal lands that include the requirements for: (1) measures to control erosion, landslides, and water runoff; (2) saving soil for final application after reshaping of disturbed areas has been completed; (3) measures to isolate, remove, or control toxic materials; and (4) reshaping of the area disturbed, and the application of soil and revegetation of disturbed areas, where reasonably practicable.

4. In California, the SMARA requires preparation and approval of a reclamation plan as part of the overall permitting process for an open pit mine. State requirements, as set forth in SMARA, require reclamation, both "...to prevent or minimize adverse effects on the environment and the public health and safety" (2711[a]) and to "...permit the continued mining of minerals and ...provide for the protection and subsequent beneficial use of the mined and reclaimed land" (2711[b]).

5. Financial assurance is required to be posted by the project proponent pursuant to 43 CFR regulations and SMARA to assure that appropriate reclamation of mining disturbances can be completed in the event that such activities are not adequately completed by the project owner or operator. Financial assurance requirements for the Briggs Project are discussed in Section 2.2.3.7.

2.1.4 HISTORY OF HEAP LEACHING

1. The first use of cyanide solution for gold extraction occurred in the late 1800s. Until the 1970s, gold extraction by cyanidation was primarily limited to conventional milling operations where ground ore particles are slurried with cyanide solution in tanks or vats. The ore must be finely ground (generally to sand, silt, or clay sized particles) because the retention time in the extraction process is short; usually hours to days. After the gold is removed from the ore particles, the barren ore particles or "tailings," as they are commonly referred to, are disposed of as a slurry or a dried filter cake in specially designed impoundment areas. Ore processing using this milling procedure is capital intensive and costly to operate, and is only economical for higher grade ores.

2. It was not until 1969 that large scale heap leaching began to be considered, based on the suggestion of the U.S. Bureau of Mines (EPA, 1988). Commercial implementation of the process occurred shortly thereafter, at a mine in northern Nevada, to extract gold from

mineralized rock that was below the economic cut-off grade for milling. Since the early 1970s, heap leaching facilities have been developed that have ranged from small, intermittent, one-man operations to large, well-capitalized operations capable of average processing rates of up to 20,000 tons of ore per day and more.

3. The heap leaching method is suitable for extracting free, disseminated, submicron particles of gold and/or silver in pervious host rock. The heap leaching process can make gold deposits economic that could not be developed using conventional milling due to its substantially lower capital requirement and operating costs. The average ore grade processed by heap leaching is about 0.05 ounces of gold per ton of rock compared to an average grade of 0.09 ounces for conventional milling (EPA, 1988).

4. Heap leaching became well established through the 1970s and 1980s, due to rising gold prices and it's suitability for low grade ore deposits. The engineering design of heap leach operations has been refined over the years to optimize gold recovery and improve environmental protection. Along with the development of heap leaching technology has been the promulgation of laws and regulations to assure that mining companies complete comprehensive engineering designs and adopt operating procedures that minimize the potential for impacts to the environment. Examples of the technical and regulatory improvements in heap leaching that have occurred over the years include the following:

   - Increased sophistication of the engineering and construction of impervious liner systems to prevent gold solution loss, and protect the underlying soil and ground water resources. Coupled with this has been a substantial increase in available synthetic liner and drainage systems. Synthetic liners are generally manufactured from plastic and are referred to as flexible membrane liners (FMLs). They can be used in place of the more traditional clay liners, or in conjunction with clay liners to construct composite liners, which provide a high level of assurance against leakage.
   - Development of engineered drainage systems (e.g., gravel layers and/or perforated piping systems) on the tops of pad liners in order to quickly drain off the solution after it percolates to the bottom of the ore pile. These drainage systems reduce the time required for leaching, and reduce the depth of solution (hydraulic head) over the impervious liner, thereby minimizing the potential for leakage. They also increase the stability of the leach pad slopes by minimizing hydrostatic pressures in the stacked ore above the liner.
   - State regulations require modern leach pad liners to meet stringent design requirements for a very low permeability and for drainage systems that minimize the hydraulic head on liners. Agency requirements also include extensive quality assurance and quality control checks during construction to assure that liner systems meet the design specifications.

- Regulatory requirements for monitoring systems in the soil under the liner and in the ground water to confirm that the process solution containment systems are functioning as designed, and that leakage which could degrade the environment is not occurring.
- Reductions in the concentration of cyanide in the leaching solution, and improvements in process facility design and operation that maximize the recycling of solution reagents within the process circuit. These developments reduce the potential to impact the environment, and allow more efficient operations due to reduced reagent handling requirements and costs.
- Development of measures that minimize the amount or surface area of solution that is exposed. This reduces the potential for wildlife to be exposed to process reagents, and evaporation and reagent consumption. Such measures include: (1) covering the process water ponds; (2) using buried drip emitters to apply process solution to the top of the leach pad instead of spray systems; and (3) configuring the solution collection ditches around the edges of the heap leach pad to avoid exposed liquid.
- Rinsing of ore piles after leaching to reduce soluble cyanide and any associated metal concentrations to very low residual levels prior to closure.

The above developments and improvements are incorporated as part of the Proposed Action, as further discussed in Section 2.2 and Chapter 4.0.

5. Although cyanide is lethal if misused, it is relatively easy to handle safely. This has been documented through the more than 100 years of experience with cyanide use in ore milling operations. Cyanide is routinely used in metallurgical operations in the major gold mining areas of the world without a history of accidents, even where unskilled labor is employed. No cyanide-related fatalities are known to have occurred at a mine site. ~~In addition, there have been no known cases of degradation to air, water or land resources due to cyanide releases from properly constructed and operated heap leaching facilities conforming with modern design, construction and operating standards.~~ This record is a result of the stringent standards for environmental protection applicable to mines using cyanide, and the unstable nature of cyanide compounds that are toxic. Under most natural conditions, cyanide volatilizes and dissipates, breaks down, or combines to complex forms which are not bioavailable.

6. With modern engineering technology and regulatory controls, heap leaching with cyanide solution can be conducted at the Briggs Project in a manner that is safe to human health and the environment. Canyon would be required to comply with applicable laws, regulations, rules, mitigation measures and permit conditions to assure that the design, construction, operation, and reclamation are conducted in an environmentally sound manner.

2.1.5 CHAPTER ORGANIZATION

1. The Proposed Action and alternatives are presented in the remainder of this chapter in the following format:
   - Section 2.2 - Proposed Action. The Proposed Action is described under the following headings:
     - **Project Objectives** lists Canyon's basic economic and environmental objectives for mineral development of the site.
     - **Mine Plan** describes the mine plan including site layout, major facilities and utilities, and operations proposed to mine the ore reserves and recover gold.
     - **Reclamation Plan** describes the reclamation activities proposed to protect public safety, minimize erosion, and return the site to a productive post-mining use.
     - **Offsite Mitigation** describes measures that would be performed on public lands offsite to offset ~~compensate for~~ onsite disturbances that would not be revegetated as part of reclamation.
   - Section 2.3 - Alternatives. Alternatives that would meet the basic objectives of the project are evaluated for feasibility and their ability to reduce or eliminate potential environmental effects.

2.2 PROPOSED ACTION

2.2.1 PROJECT OBJECTIVES

1. The Proposed Action has been designed to accomplish Canyon's basic objectives for the Briggs Project, which include the following:
   - Develop a commercial mine to recover gold from the ore body.
   - Efficiently design and manage the project to optimize gold recovery and meet expected financial returns for corporate shareholders.
   - Minimize surface disturbances and mitigate other potential environmental effects.
   - Perform reclamation that will return the site to a state that is consistent with surrounding land uses following mining.
   - Recover gold at an economic ore processing rate of about 4 million tons per year.
   - Construct, operate, and reclaim the site in a manner consistent with federal, state, and local laws and regulations.
   - Provide mitigation as an integral part of the Proposed Action that offsets ~~compensates for~~ onsite disturbances that would not be revegetated as part of reclamation.

2.2.2 MINE PLAN

1. Project plans for facilities and operations are described in the following sections, based upon consultation with Canyon, and the following sources of information:

   - *Briggs Project Plan of* Operations (Canyon, 1993b).
   - *Briggs Project Application for Conditional Use Permit* (Canyon, 1992c).
   - *Briggs Project Application for Mining Reclamation Plan* (Canyon, 1992b).
   - *Site Closure and Reclamation Plan for the Briggs Project* (Cedar Creek Associates, Inc., 1993c).
   - *Briggs Project Report of Waste Discharge* (WESTEC, Inc., 1993c).
   - *Briggs Project Application for a Section 404 Permit* (Canyon, 1993c).
   - *Briggs Project Authority to Construct Application* (Air Sciences, Inc., 1994).
   - *Feasibility Level Design Report, Briggs Project* (WESTEC, Inc., 1993a).
   - *Feasibility Level Design Report for Surface Hydrology and Storm Water Controls, Briggs Project* (WESTEC, Inc., 1993b).
   - *Ground Water Supply Study, Briggs Project* (Hydro-Geo Consultants, Inc., 1993a).
   - *Briggs Project Application for Mineral Material Sale* (Canyon, 1994).

   These documents are hereby incorporated by reference. Documents incorporated by reference, as specified throughout this EIS/EIR, are on file and available for public review at the offices of the County Planning Department and Ridgecrest Resource Area BLM.

2. In addition, other knowledge of mine development or operating requirements known to be associated with similar mines that may not be specified in the applications, was used in the preparation of this document, based on the experience of the EIS/EIR preparers. Canyon has reviewed and concurred with the discussion of the Proposed Action to assure commitment to the design elements necessary to provide for the projected results.

3. The mine plan in this section is organized as follows:

   - 2.2.2.1 Site Layout, Work Force and Operating Parameters
   - 2.2.2.2 Mining
   - 2.2.2.3 Heap Leach System
   - 2.2.2.4 Gold Recovery
   - 2.2.2.5 Ancillary Facilities and Operations
   - 2.2.2.6 Site Security and Safety
   - 2.2.2.7 Environmental Monitoring and Protection
   - 2.2.2.8 Spill Prevention

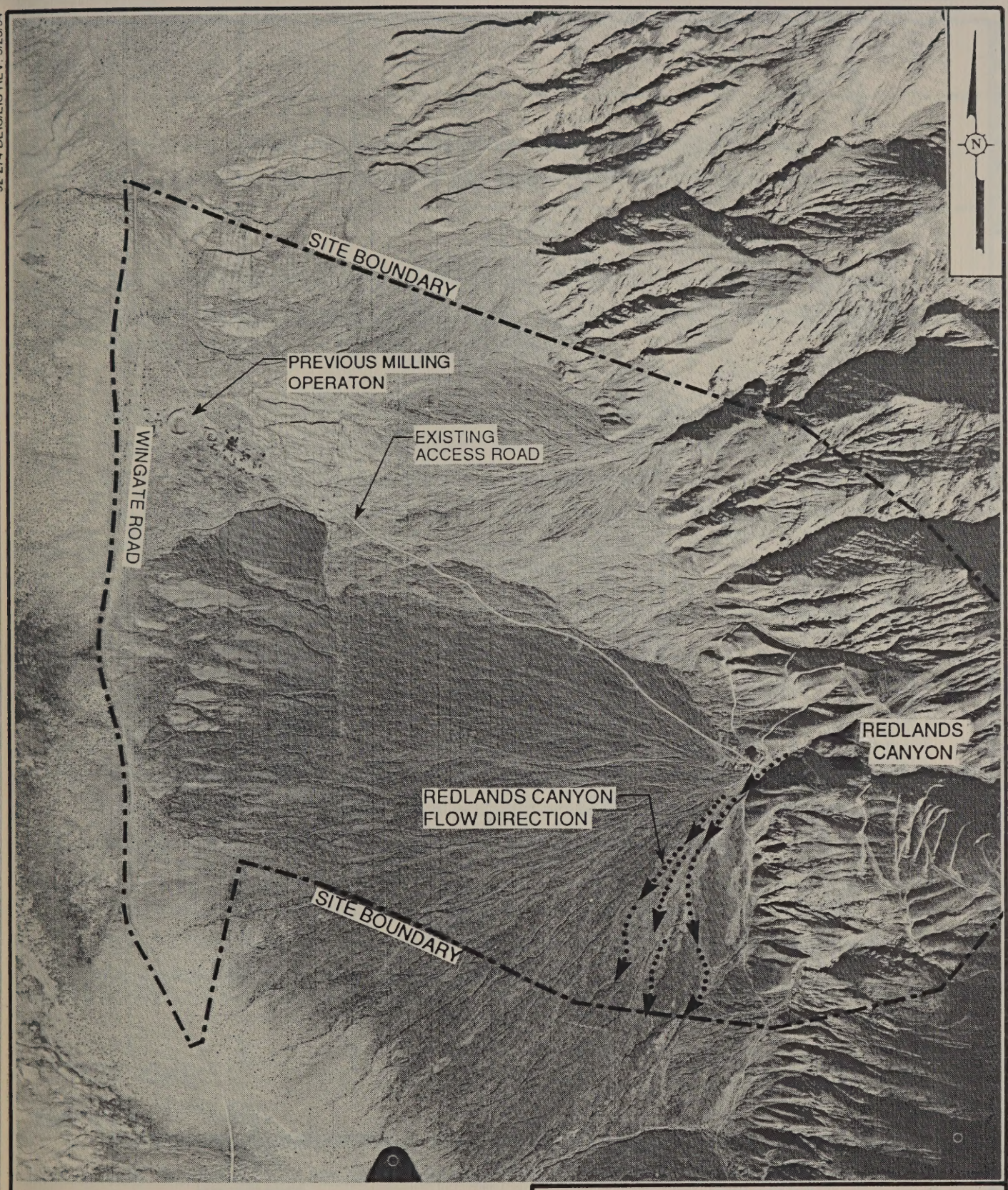
2.2.2.1 Site Layout, Work Force, and Operating Parameters

2.2.2.1.1 Site Layout

1. The Briggs Project site is located at the mouth of Redlands Canyon, on the lowermost slopes of the Panamint Range and the adjacent alluvial fan, as shown in Figure 2.2. The mine layout as proposed by Canyon is depicted in Figure 2.3, and incorporates the following key elements:
   - The **mine pit** location and configuration is dictated by the location of ore bodies, as defined by exploratory drilling and analysis.
   - The **waste rock dumps** and **crusher** would be located near the mine pit in order to minimize haul distances and fuel use.
   - The **heap leach pad** would be located on a graded area in the middle region of the alluvial fan and in close proximity to the pit.
   - The **process water ponds** and **gold processing plant** would be located at the downgradient end of the leach pad, allowing solution to flow by gravity, and thereby minimizing pumping and associated energy consumption.
   - The **growth media stockpiles** for storage of surficial materials removed from disturbed areas would be located adjacent to surface disturbances to minimize haul distance when the material is used during reclamation. The stockpiled growth media would be spread over disturbed surfaces during reclamation to help promote plant growth.

2.2.2.1.2 Construction and Operations Schedule

1. As discussed in Chapter 1.0, initial project construction is scheduled to commence in late 1994 and last about six to eight months. The primary initial construction activities would include:
   - Salvaging of growth media from areas that would be disturbed during initial construction and the initial portion of operations.
   - Grading of site drainage controls to protect project facilities from run-on and control site runoff.
   - Grading of haul roads, access roads, and building pads for project facilities.
   - Installation of water wells, pipelines and storage.
   - Initial removal of waste rock to allow access to the ore.
   - Construction of site buildings and structures, fuel, oil and reagent storage areas, the gold processing plant, crushing and conveying circuits, onsite electric generators, and other equipment.
   - Construction of the process water ponds.
   - Construction of an initial area of heap leach pad (e.g., about 20 percent of the total pad) sized to accommodate an initial portion of the ore to be excavated, and accompanying solution transport ditches and piping.



0 1,200 2,400 FEET

APPROXIMATE SCALE

REFERENCE:
AERIAL PHOTOGRAPH TAKEN BY INTRA SEARCH,
DENVER, COLORADO, DATED 12/28/87.

FIGURE 2.2

**SITE LOCATION -
AERIAL PHOTOGRAPH**

BRIGGS PROJECT

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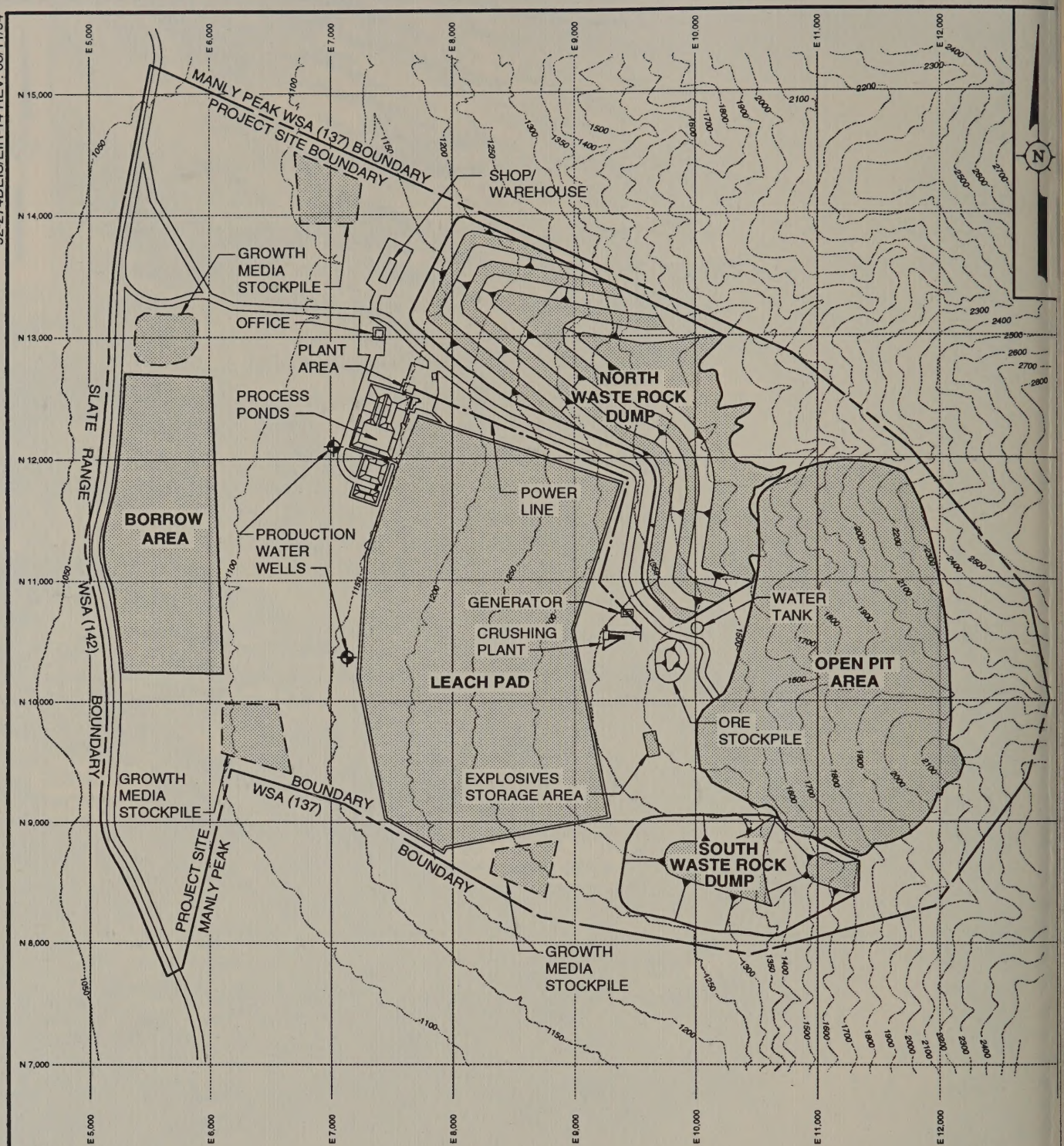


FIGURE 2.3

PRELIMINARY SITE PLAN

BRIGGS PROJECT

REFERENCE: CANYON, 1993b.

ENVIRONMENTAL SOLUTIONS, INC.

To the extent practical, components of buildings, equipment and structures would be prefabricated and shipped to the site for final assembly to increase efficiency and minimize construction time.

2. Most construction is expected to follow a normal schedule of a five- or six-day work week, with activities occurring during daylight hours. During some periods, construction could be ongoing 24 hours per day and seven days per week.

3. Initial project operations will overlap construction as elements of the project are completed. During operations, ore leaching would be conducted 24 hours per day, seven days per week. Mining, ore crushing and pad loading would generally occur 20 hours per day, six days per week, but may occur up to 24 hours per day, seven days per week. Blasting would occur during daylight hours only.

4. Reclamation would occur concurrent with operations. Decommissioning of site facilities and final reclamation is expected to be initiated by about the year 2001.

2.2.2.1.3 Work Force

1. Short-term personnel needs for project construction activities are anticipated at approximately 155 people. Construction activities and personnel would likely peak at about the sixth month, then decline over a period of two months until construction is complete.

2. Long-term personnel requirements for project operations (mining and beneficiation) are expected to be about 130. After mining, approximately 25 personnel would remain onsite to complete leaching and heap leach decommissioning.

2.2.2.2 Mining

2.2.2.2.1 Mining Rate

1. The mine would have the capacity to move up to 45,000 tons per day (tpd) of ore and waste rock. Daily excavation and material handling (total ore and waste rock) would generally vary from 25,000 to 40,000 tpd over the life of the mine. Ore would normally be crushed and delivered to the heap leach pad at a rate of about 10,000 to 15,000 tpd. Maximum crusher throughput would be about 17,000 tpd.

2.2.2.2.2 Mine Pit

1. Geologic structures and mineralization in the pit area would be mapped in detail as excavation proceeds and infill drilling data is obtained during mine operations. This data would be used to engineer the pit outline and final pit slopes in a configuration that: (1) provides adequate slope stability considering the spacing, orientation and strength properties of geologic structures occurring in or near the pit walls; and (2) minimizes the amount of waste rock that must be excavated, and the associated size of the waste rock piles, while optimizing ore recovery. The maximum expected pit configuration is shown in Figure 2.4. Dimensions of the maximum configuration are summarized in Table 2.1. The final pit configuration would be smaller than the maximum pit shown, unless more ore than currently anticipated is discovered or changes to preliminary project planning are required based on operational-phase data collection (e.g., modification of pit slope angles to provide adequate stability).

2. Studies conducted for project planning (WESTEC, Inc., 1993a) indicate that most of the rock that would form the pit walls is strong and can be safely excavated at relatively steep overall slope angles (e.g., up to about 60 degrees where geologic structure conditions are favorable). A small portion of rock that would occur in the upper portion of the pit is highly weathered and fractured and would be excavated at lower overall slopes (e.g., 45 degrees). The pit slopes would be benched to minimize raveling of lose pieces of rock. Benches would be provided at regular vertical intervals with the spacing and width dependent upon rock conditions. Current mine planning is based on 15- to 20-foot wide benches located at vertical intervals of 40 to 60 feet. Maximum vertical intervals of up to 100 feet could be used at some locations with a wider bench (e.g., 25 feet or more).

3. Haul roads would be constructed along the pit walls for transport of ore and waste rock. Haul roads would be an average of 60 feet wide and would include side safety berms in accordance with Mine Safety and Health Administration (MSHA) requirements. Haul roads would be designed with a maximum grade of 10 percent except possibly for short pitches where steeper grades may be required.

2.2.2.2.3 Waste Rock and Protore

1. Waste rock surrounds the ore bodies. Excavation and disposal of waste rock will be required to expose ore and develop a properly engineered mine pit. Waste rock would be disposed in

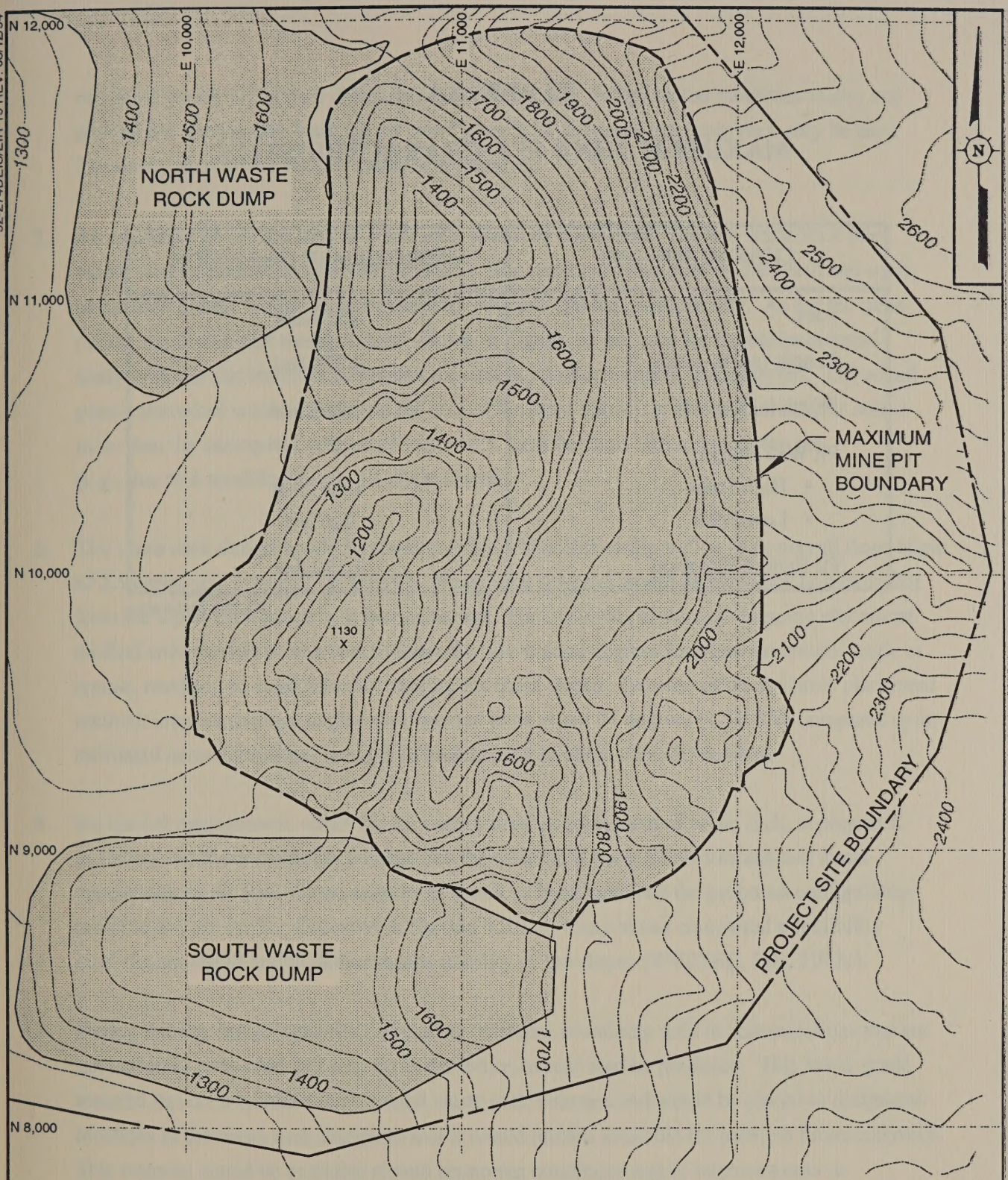


FIGURE 2.4

MAXIMUM MINE PIT CONFIGURATION

BRIGGS PROJECT

REFERENCE: CANYON, 1993b.

ENVIRONMENTAL SOLUTIONS, INC.

TABLE 2.1

MAXIMUM MINE PIT CHARACTERISTICS

CHARACTERISTIC	APPROXIMATE DIMENSION
Area	112 acres
Length (north-south)	3,300 feet
Width (east-west)	2,200 feet
Pit Wall Height	
• High Point	1,100 feet
• Low Point	220 feet
Pit Bottom Elevation	1,130 feet

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two areas (north waste rock dump and south waste rock dump) on the mountain slopes and alluvial fan surface that flank the pit (see Figure 2.3). Some of the waste rock may be used for construction where borrow material is required.

2. An estimated 27 million tons of waste rock would be excavated. The two waste rock piles would cover a maximum of about 126 acres. The maximum thickness of the north and south waste rock dumps would be approximately 300 and 180 feet, respectively. As for the mine pit, the maximum pile configurations shown in Figure 2.3 are used for the environmental analysis in this document to assure that maximum possible impacts are addressed. The actual piles constructed would not exceed the size of the areas shown; and would be smaller unless more than the anticipated volume of waste rock must be excavated to access the ore (e.g., due to a modification in pit slope angles).

3. The waste rock dumps would be constructed in a benched configuration at an overall slope angle of 2.5 horizontal:1 vertical (2.5H:1V). Waste rock material would be placed by end-dumping from the top of each bench as it is constructed. The dynamics of the end-dumping placement method would result in interbench slopes that are several degrees less than the natural angle of repose, resulting in some inherent stability for these slopes. Because of the dynamic placement method, interbench slope angles are expected to be about 34 degrees (1.5H:1V) compared to an estimated natural frictional strength of broken rock of about 45 to 50 degrees.

4. No special management, either for the containment or placement of waste rock, is projected, as testing and characterization indicate that the material is not net acid-forming and metal concentrations are low. Slope stability evaluations have indicated the proposed configuration is stable and are further discussed in Section 4.2.1.2. Canyon has completed a feasibility level design report which demonstrates stability of the slopes (WESTEC, Inc., 1993c).

5. During mining, limited quantities of protore (material containing gold in concentrations that are not currently economic, but may be in the future) would also be produced. This lower grade material has been included in estimated waste rock volumes and would be placed in designated locations in the waste rock dumps so that it would remain available for possible future recovery. This material would be available should economic conditions and/or improvements in processing technology allow profitable gold recovery.

6. The amount of protore anticipated to be recovered is expected to be relatively small (e.g., several million tons or less). The protore would be placed in the top level of the waste

rock piles or at the outer edge of the piles so that it is accessible. Because of increased costs for double-handling, it is not likely that protore would become economic within the life of the project. It is planned that the protore portions of the pile would be reclaimed at the same time and using the same measures as the remainder of the waste rock piles. This resource would remain available over the long term for possible recovery under a future project proposal. In the event that protore processing were to become economic during the life of the Briggs Project, it would be recovered using normal onsite equipment (e.g., front-end loaders and haul trucks) and processed accordingly. In this case, the waste rock piles where the protore is removed would be left in a configuration and reclaimed in a manner consistent with the overall waste rock pile descriptions discussed in this document.

2.2.2.2.4 Ore Crushing and Conveying

1. The location of the ore crushing plant is shown in Figure 2.3. Ore from the mine pit would be hauled in large end-dump haul trucks, either directly to the crusher facility or onto a temporary stockpile located nearby. The ore stockpile would contain ore that: (1) is hauled from the pit at times when the crusher is not operating; and/or (2) is needed for blending purposes to provide a desired ore grade mix.

2. The ore crushing facility would incorporate crushers, conveyors, and screens. The crushers would be mounted on concrete and steel foundations. Crushing would reduce ore to approximately 1/4-inch size for leaching efficiency. Between each crushing stage, screens would classify the crushed ore particles by size, feeding oversize material through the next crushing stage and remove ore that has reached the desired size from the crushing circuit. Through this procedure, power consumption and dust generation associated with crushing are minimized.

3. The ore stacking system would consist of both fixed and mobile conveyors. A radial stacker would be used to place the crushed ore on the leach pad. In the event of a power shutdown or conveyor breakdown, ore could be delivered to the pad by haul trucks. Some ore could be stacked on the leach pad without crushing.

4. Primary haul roads would connect the mine pit to the waste rock dumps and crusher area. These roads would be designed by mine engineers and constructed using onsite equipment. Road dimensions and characteristics are discussed in Section 2.2.2.5.5.

2.2.2.2.5 Mining Practices

1. Conventional mining practices would be used. These encompass:
   - Drilling and blasting to loosen and fragment waste rock and ore.
   - Excavating and loading waste rock and ore into haul trucks for removal from the mine pit.
   - Hauling waste rock to the waste rock dumps, and ore to the crusher for processing.

   Some near-surface gravels that cover the ore body may not require use of explosives. Excavation and loading of material into haul trucks would be performed using a hydraulic shovel or front-end loader.

2. Blasthole drilling would be accomplished using diesel-powered rotary or percussion blasthole drills. It is anticipated that ammonium nitrate and fuel oil (ANFO) would be used for blasting. The ANFO would be mixed onsite by combining ammonium nitrate prill (a common plant fertilizer) from a storage silo with diesel fuel. The depth to ground water in the pit area will prevent the contact of the ANFO with water resources. Blasts would be engineered to use the minimum amount of explosive needed to achieve the desired breakage. This keeps blasting costs down and minimizes noise and fly-rock.

3. Blasting would normally occur once per day. All blasting would occur during daylight hours. Explosives and detonators would be stored in an approved magazine located onsite in accordance with federal regulations (27 CFR Part 55). The preliminary location of the explosives storage area is shown in Figure 2.3. Radio-detonated explosives would not be used, so interference by military, law enforcement or civilian radio use is not anticipated.

4. Dust control measures would be implemented as an integral part of mining operations. A road grader would be used to maintain road surfaces. Haul roads would be sprayed with water as needed to control fugitive dust. Surfactants or chemical binders would be added, as needed, to provide longer-term dust suppression and reduce water use. Baghouses, in conjunction with shrouding and water sprayers, would be used to control fugitive dust from screening, crushing, and conveying ore. If disposal of baghouse filters is required, they would be disposed of offsite in accordance with applicable regulations.

2.2.2.3 Heap Leach System

1. The primary elements of the heap leach system are: (1) the heap leach pad; (2) process water ponds; and (3) piping systems used to distribute and circulate the leaching solution. Basic components of the planned system are illustrated in Figure 2.1.

2. The entire heap leach process would be designed as a zero-discharge system in accordance with RWQCB requirements; all solutions would be recycled. Make-up water would be required to compensate for evaporation losses and moisture retention by leached ore.

2.2.2.3.1 Heap Leach Pad and Solution Pond Construction

1. Good design and construction of solution containment liner systems is a key aspect of modern gold mining technology. Minimizing the potential for escape of process solutions is a primary factor in protecting the quality of water resources. It is also important from an operational viewpoint because escape of process solution can result in environmental liability, loss of gold, and increased operating costs due to escape of reagents. Modern technology for design and construction of low permeability liners allow effective containment when liners are properly installed.

2. The configuration of the liner systems that would be used for the Briggs Project are subject to approval by the RWQCB based on performance criteria specified in CCR Title 23 Chapter 15. Canyon has submitted a Report of Waste Discharge to the RWQCB in accordance with these regulations in application for a permit (Waste Discharge Order) to construct and operate the project. The Report of Waste Discharge includes preliminary liner designs consisting of double plastic FMLs for the process water ponds and process solution piping ditches, and a composite FML/clay liner for the heap leach pad. If adequate quantities of clay cannot be practically obtained for leach pad construction, the leach pad liner or portions thereof may be constructed with double FML liners instead of the composite liner, subject to RWQCB approval. Either type of liner could be designed to satisfy requirements of CCR Title 23. Details of the liner systems are provided in the following sections.

3. FMLs are manufactured of durable plastic compounds that are formulated according to requirements for long-term flexibility and resistance to weathering. Proper seaming of FML

sheets is critical to ensure a flexible water-tight bond. Quality control procedures are implemented by the manufacturer and installer to ensure high quality construction. Typical quality control procedures include:

- As seaming proceeds, each seam is tested for integrity. Unacceptable seams are repaired and retested until quality specifications are met.
- In addition to seam testing, the entire liner is inspected for imperfections that could affect its integrity.
- The seaming process and its quality control would be certified by a supervising professional engineer.
- Providing reports to the RWQCB detailing quality control testing results and, where necessary, any corrective actions initiated.

4. Clay liners are also constructed under scrutiny of qualified personnel to ensure that the clay is placed in a suitable thickness and adequately compacted. Physical properties of the compacted clay are carefully tested to confirm that it meets specified low permeability requirements. It is anticipated that clay for liner construction would be obtained from a nearby borrow pit. Some clay may also be obtained from zones of fault gouge within the waste rock material to be excavated from the mine pit. A description of clay borrow for leach pad construction is provided in Section 2.2.2.5.6.

5. The process water ponds would be installed as a part of initial project construction. Leach pad liner construction would occur in several phases, beginning with initial construction of the northwestern portion of the pad adjacent to the process water ponds. Liner construction would occur over contiguous areas during the operational life of the project to accommodate the required ore capacity. The phased leach pad expansions would be designed so that continuous solution containment would be provided. As new areas of liner are constructed, the liner of contiguous areas would be joined together, including welding of seams between the FML sheets, so that the liner is continuous under the entire leach pad.

2.2.2.3.2 Heap Leach Pad

1. The maximum anticipated leach pad configuration would cover approximately 138 acres. The heap leach pad would be located on the middle portion of the alluvial fan west of the mine pit. The current drainage path for the occasional flows that occur from Redlands Canyon is primarily southwest over the fan surface (Figure 2.2) near the extreme southeast corner of the leach pad location. To assure that the leach pad is adequately protected from run-on and

migration of the braided washes that carry flow from Redlands Canyon, a dike would be constructed to maintain the approximate current drainage location. This dike and other site drainage controls are further discussed in Section 2.2.2.5.3.

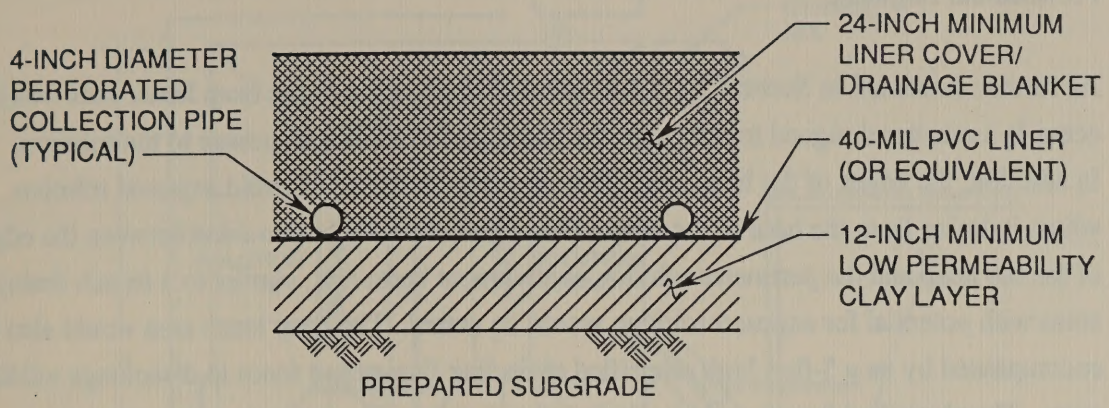
2. The maximum leach pad could accommodate up to about 26 million tons of ore at a thickness of 150 feet, and would be designed and constructed in phases concurrent with ore production. The 26-million ton capacity allows for an excess of about 25 percent over current reserves to allow for necessary operational flexibility; for example, some material currently defined as protore may be found economic, or leaching characteristics may prohibit the 150-foot height.

3. Details of the preliminary design for the heap leach pad composite liner system are shown in Figure 2.5. Details of an example configuration that could be used for the double FML system if adequate clay cannot be obtained are also shown.

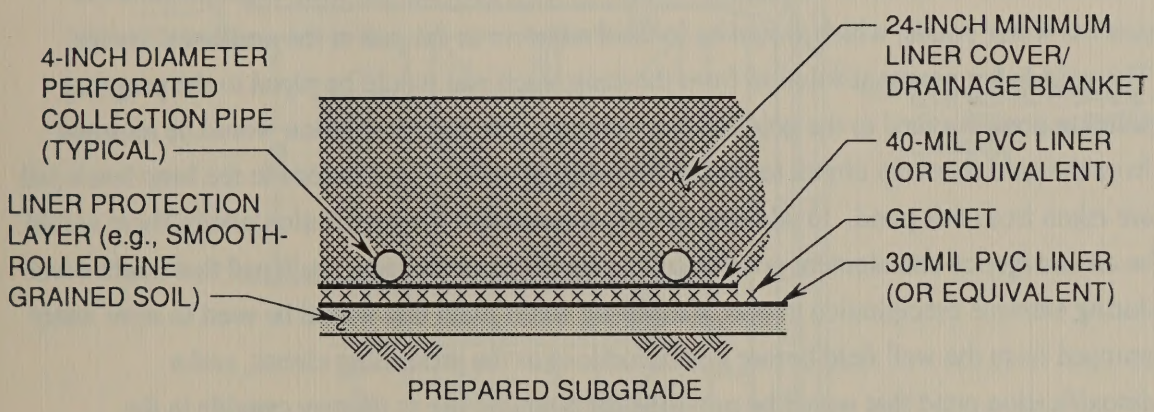
4. Following clearing, grubbing and removal of salvageable growth media from the leach pad construction area, the surface would be rough-graded to achieve the desired contours for adequate drainage and solution containment. Any unconsolidated material not suitable for leach pad foundation would be reworked and compacted. As part of finish grading, the pad subgrade would be prepared by scarifying, moisture conditioning and reworking the surface. The liner would then be installed.

5. The composite liner system would consist of a minimum of 12 inches of compacted clay with a maximum permeability of $1x10^{-6}$ centimeters per second (cm/sec), overlain by a 40-mil thick polyvinyl chloride (PVC) FML, or an approved engineering equivalent. Prior to installation of the FML, the surface of the compacted clay component will be carefully inspected and any objects that could cause damage to the FML, such as protruding rock particles, would be removed. Perforated solution collection pipes and a minimum of 24 inches of clean-fine gravel will be provided over the FML to facilitate solution drainage to the edge of the pile, thereby minimizing hydrostatic pressure over the liner.

6. If the double FML configuration is used, the combined thickness and permeability would provide a permeability equal to or less than the composite configuration. A geonet or other drainage medium would be installed between the layers to provide for detection of any minor seepage that might occur through the upper liner. Subgrade preparation and overliner drainage would be the same as for the composite liner system.



COMPOSITE LINER DETAIL



EXAMPLE DOUBLE-FML LINER DETAIL

NOT TO SCALE

NOTE:
THESE CROSS SECTIONS ARE INTENDED TO SHOW TYPICAL LINER SYSTEM CONFIGURATIONS FOR PUBLIC INFORMATION PURPOSES AND EIS/EIR EVALUATION. ACTUAL CONFIGURATIONS FOR THE BRIGGS PROJECT WILL BE SUBJECT TO APPROVAL BY THE RWQCB BASED ON ENGINEERING PERFORMANCE STANDARDS THAT MEET STATE REGULATIONS (CCR TITLE 23, CHAPTER 15).

FIGURE 2.5

LEACH PAD LINER DETAIL

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7. The entire pad will be designed and constructed under the supervision of a qualified Professional Engineer.

8. As further discussed in Section 2.2.2.3.4, solution application to the heap leach pads would occur in a manner designed to minimize the potential for wildlife exposure to the solution. In addition, the edges of the heap leach pile would be designed to avoid exposed solution where it drains from the base of the heap. Clean gravel would be provided between the edges of the ore heap and the perimeter solution containment berm (i.e., similar to a french drain), or areas with potential for exposed solution would be netted. The heap leach area would also be encompassed by ~~an~~ a 5-foot high electrified ~~chain link~~ five-strand fence to discourage wildlife entry. The electrified fence would be designed and operated to minimize the potential for injury to wildlife. There would be openings in the fence for necessary operations access, but the fence is expected to provide some level of deterrence.

2.2.2.3.3 Process Water Ponds

1. Process water would be circulated in a closed system between the heap leach pad and the process water ponds, which would be located adjacent to the pad at the northwest corner. The gold-laden pregnant solution from the heap leach pad would be piped to the pregnant solution pond for feed to the gold recovery circuit. The barren solution would be returned from the gold recovery circuit to the barren solution pond. Applications to the heap leach pad are taken from this pond. In addition to the pregnant and barren solution ponds, there would be an emergency containment pond to collect runoff from the heap leach pad that might occur during extreme precipitation events, a make-up water pond that would be used to store water pumped from the well field before it is introduced to the processing circuit, and a detoxification pond that would be provided for potential use to destroy cyanide in the processing solution in the event that it is ever required due to system upset. The layout of the process water ponds is shown in Figure 2.6.

2. Preliminary pond characteristics include the following:

Pond Type	Depth (feet)	Dimensions (feet)	Approximate Capacity (million gallons)
Pregnant	13	100 x 270	1.4 (plus 2-foot freeboard)
Barren	15	140 x 270	2.5 (plus 2-foot freeboard)
Emergency Containment	15	350 x 550	16.8
Make-Up Water	15	200 x 200	2.8
Detoxification	15	100 x 200	1.0

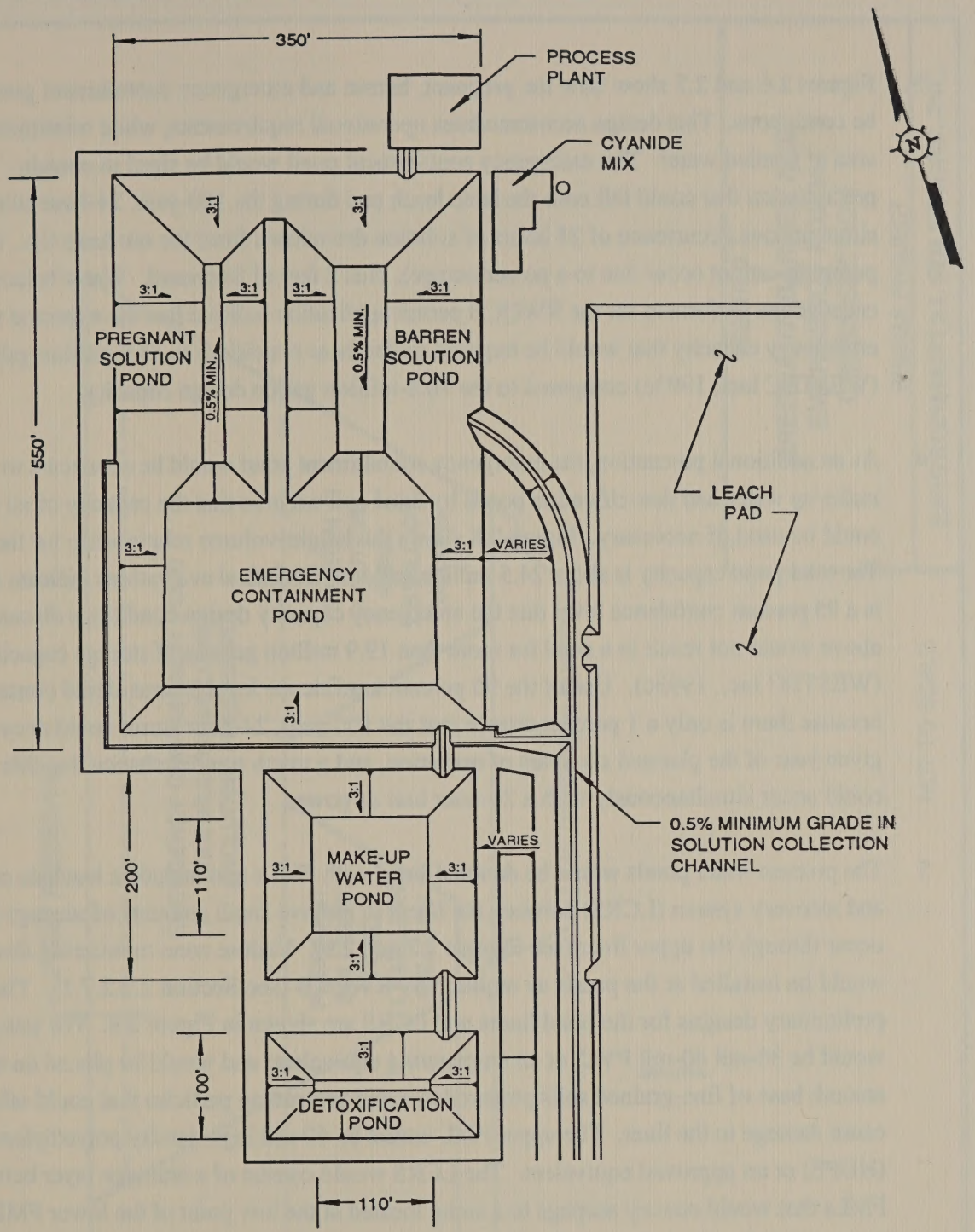


FIGURE 2.6

PROCESS WATER PONDS LAYOUT

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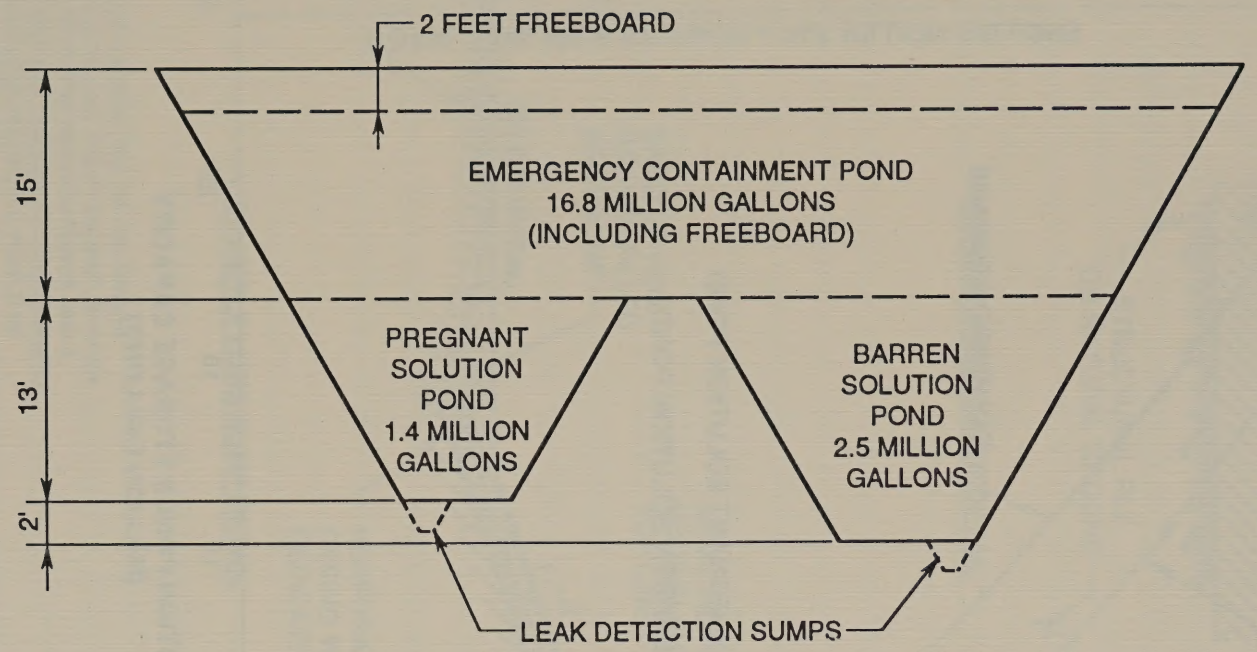
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REFERENCE: WESTEC, INC., 1993c.

3. Figures 2.6 and 2.7 show how the pregnant, barren and emergency containment ponds would be contiguous. This design accommodates operational requirements, while minimizing the area of ponded water. The emergency containment pond would be sized to contain precipitation that could fall onto the heap leach pad during the 100-year, 24-hour storm, with simultaneous occurrence of 24 hours of solution draindown from the ore heap (i.e., if solution pumping cannot occur due to a power outage), plus 2 feet of freeboard. Water balance calculations performed for the RWQCB permit application indicate that the expected volume of emergency capacity that would be required under these conditions is 15.9 million gallons (WESTEC Inc., 1993c) compared to the 16.8-million gallon design capacity.

4. As an additional precaution, the emergency containment pond would be connected to the make-up water and detoxification ponds by lined spillways so that the capacity of all the ponds could be used, if necessary. Figure 2.8 shows the height-volume relationship for the ponds. The total pond capacity is about 24.5 million gallons. Statistical evaluations indicate that there is a 95 percent confidence level that the emergency capacity design conditions discussed above would not result in a need for more than 19.9 million gallons of storage capacity (WESTEC Inc., 1993c). Use of the 95 percent confidence level is considered conservative because there is only a 1 percent chance that the 100-year, 24-hour storm could occur in any given year of the planned six years of operation, and a much smaller chance that this storm could occur simultaneously with a 24-hour loss of power.

5. The process water ponds would be doubled-lined with FMLs and include a leachate collection and recovery system (LCRS) between the liners to remove small amounts of seepage that may occur through the upper liner (see Figures 2.7 and 2.9). Vadose zone monitoring devices would be installed at the ponds as required by RWQCB (see Section 2.2.2.7.1). The preliminary designs for the pond liners and LCRS are shown in Figure 2.9. The lower FML would be ~~30-mil~~ 40-mil PVC, or an engineering equivalent, and would be placed on top of a smooth base of fine-grained soils prepared to avoid protruding particles that could otherwise cause damage to the liner. The upper FML would be 60-mil high density polyethylene (HDPE) or an approved equivalent. The LCRS would consist of a drainage layer between the FMLs that would convey seepage to a sump located at the low point of the lower FML. The sump would have a dedicated, fluid level activated automatic pump that would remove seepage and recirculate it to the pond. The LCRS would be designed to minimize the hydrostatic head over the lower liner so that there is little or no driving force for seepage of fluid through the lower liner. As for other aspects of the pond construction, final designs would be subject to approval by the RWQCB pursuant to the permit application that Canyon has submitted.



NOT TO SCALE

REFERENCE: WESTEC, INC., 1993c.

FIGURE 2.7

PREGNANT, BARREN AND EMERGENCY PONDS CROSS SECTION

BRIGGS PROJECT

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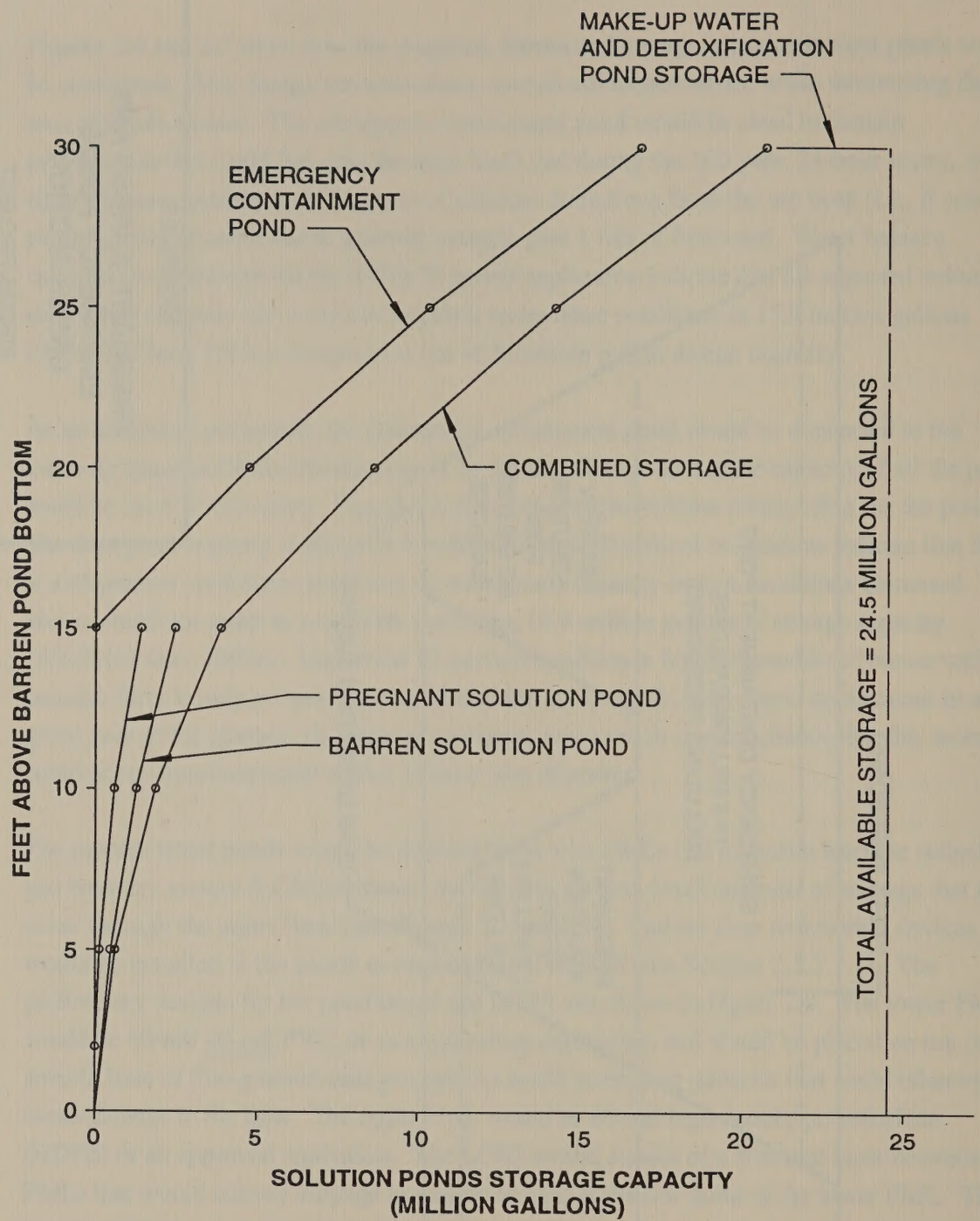


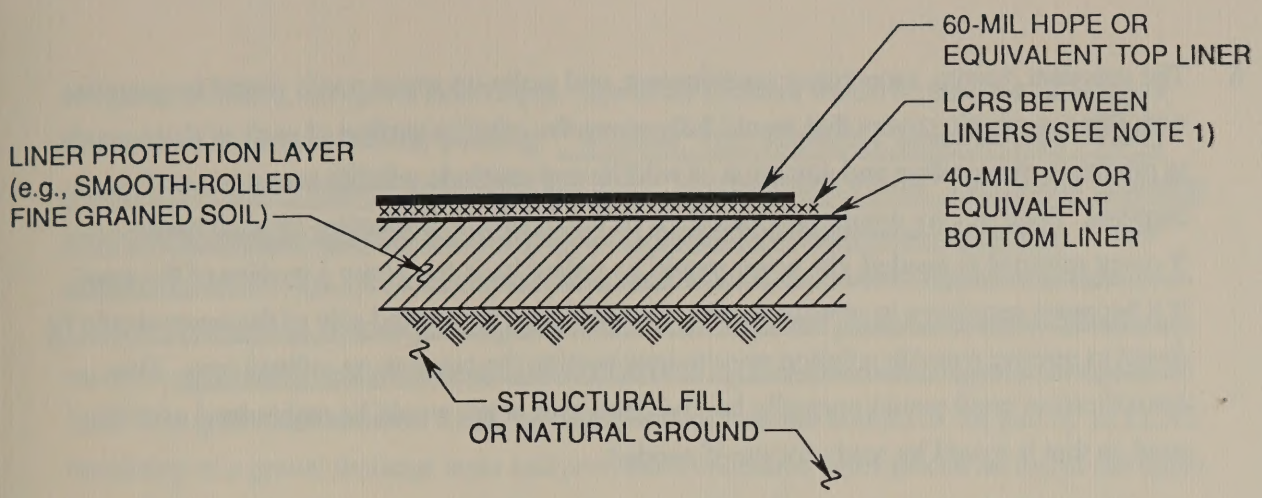
FIGURE 2.8

PREGNANT, BARREN AND EMERGENCY CONTAINMENT PONDS HEIGHT-VOLUME RELATIONSHIP

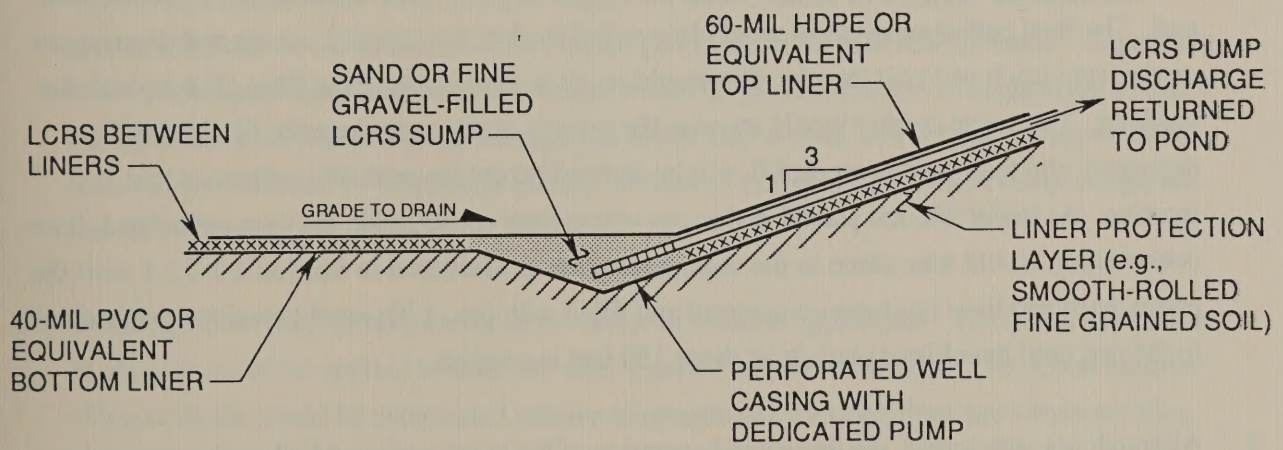
BRIGGS PROJECT

REFERENCE: WESTEC, INC., 1993c.

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TYPICAL POND LINER DETAIL



EXAMPLE LCRS SUMP DETAIL

NOTES:

1. PRELIMINARY DESIGNS SUBMITTED TO THE RWQCB SPECIFY A GEONET LCRS FOR THE PREGNANT, BARREN, MAKE-UP WATER AND DETOXIFICATION PONDS AND A GEOTEXTILE LCRS FOR THE EMERGENCY CONTAINMENT POND. ALL LINER AND LCRS MATERIALS WOULD BE SUBJECT TO RWQCB APPROVAL.

2. THESE CROSS SECTIONS ARE INTENDED TO SHOW TYPICAL LINER SYSTEM CONFIGURATIONS FOR PUBLIC INFORMATION PURPOSES AND EIS/EIR EVALUATION. ACTUAL CONFIGURATIONS FOR THE BRIGGS PROJECT WILL BE SUBJECT TO APPROVAL BY THE RWQCB BASED ON ENGINEERING PERFORMANCE STANDARDS THAT MEET STATE REGULATIONS (CCR TITLE 23, CHAPTER 15).

REFERENCE: LINER DETAIL ADAPTED FROM WESTEC, INC., 1993c.

NOT TO SCALE

FIGURE 2.9

TYPICAL
POND LINER AND LCRS DETAIL

BRIGGS PROJECT

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6. The pregnant, barren, emergency containment, and make-up water ponds would be provided with floating plastic covers that would fully cover the solution surface of each of these ponds to minimize evaporation and attraction of wildlife and preclude wildlife access to pond contents. Pond covers would only be removed for repairs or inspection of pond liners. If cover removal is needed, the cover would be pulled back to expose a portion of the pond. If it becomes necessary to remove a pond cover entirely, the wetted side of the cover would be rinsed to remove cyanide solution prior to transporting the cover to an unlined area. The detoxification pond would normally be dry. However, a net would be maintained over this pond so that it would be ready for use if needed.

7. ~~Fencing~~ A 6-foot high chain link fence would be provided around the perimeter of the pond area to discourage access by terrestrial wildlife.

2.2.2.3.4 Heap Leaching and Solution Management

1. A series of stationary and mobile conveyors would be used to stack the crushed ore on the leach pad. The final conveyor segment would be a radial stacker that pivots in an arc and deposits ore on the heap leach pad as it travels. Ore would be stacked in layers about 25 to 30 feet thick for leaching. The radial stacker would traverse the portion of the pad where the lift is to be deposited, and then each layer, or lift, will be leached before the next lift is placed at that location. As initial lifts are placed in the area where liner construction has been completed, liner construction would take place in the contiguous area as discussed in Section 2.2.2.3.1 until the entire leach pad liner has been constructed and filled with ore. Lifts would continue to be added to the pad until the ultimate height of about 150 feet is reached.

2. Although not anticipated, the design and operation of the leach pad would allow the placement of crushed or uncrushed (run-of-mine) ore on the leach pad using end-dump trucks instead of the conveyor if necessary during short periods of the operation, for example due to unforeseen crusher system or conveyor equipment upset. If this scenario were to occur, the ore could be end-dumped in a manner similar to the waste rock piles. If this were to occur on the lower lift, liner protection would be provided in accordance with RWQCB requirements to avoid damaging the FMLs, and the top of the lift would be ripped prior to placement of the next lift, if necessary to relieve compaction from haul traffic and assure good percolation without channeling.

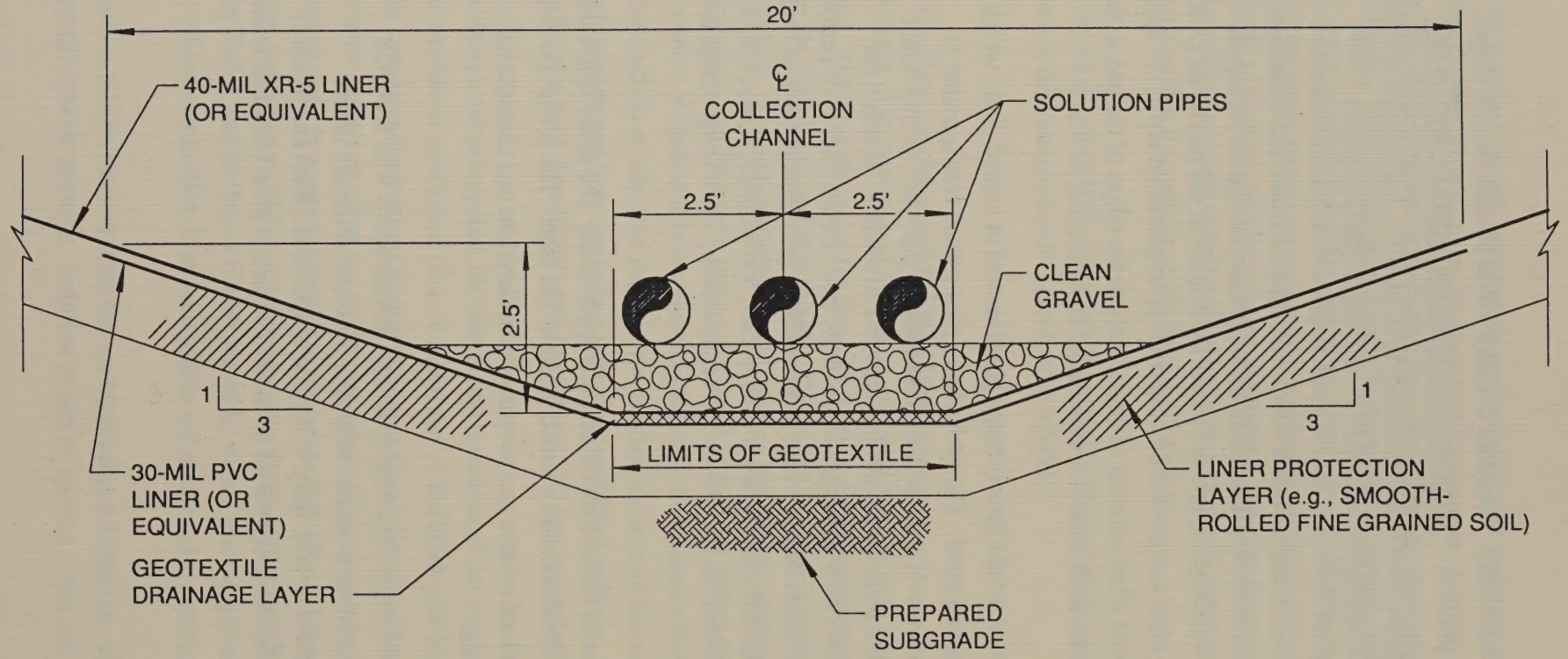
3. Gold would be leached from the ore heap using a dilute (i.e., about 250 parts per million [ppm]) cyanide solution. Solution would be applied to the ore heap using buried drip

irrigation emitters, except on side slopes. Sprinkler emitters would be used on side slopes, where there is no potential for ponding. "Wobbler" type sprinklers would be used on side slopes to produce a large water droplet and a low, short-trajectory path. This would minimize evaporation and the potential for wind transport of solution away from lined areas. Under certain circumstances, sprinkler emitters may also be used elsewhere. Application rates of leach solutions may vary, depending on ore characteristics and percolation rates. However, rates are expected to range from about 0.002 to 0.007 gallon per minute (gpm) per square foot. The gold laden solution would be transported across the bottom of the pad by an LCRS consisting of a gravel drainage layer and perforated collection pipes placed on top of the upper liner. The perforated pipes would allow solution to drain freely to the edges of the pad so that buildup of water pressure over the liner would be minimal.

4. From the edge of the pad, solution would flow through pipes located in a lined ditch, which would carry solution to the pregnant pond. The preliminary piping ditch configuration is shown in Figure 2.10. The ditch would contain gravel beneath the pipes so that any minor leakage that might occur from the pipes would not be accessible to wildlife. Beneath the gravel, the ditch would be double-lined, with a geotextile drain between the liners. At periodic intervals along the length of the ditch, sumps would be provided in the drainage layer so that it can be determined if any seepage through the upper liner occurs, and seepage, if any, can be removed and returned to the process circuit. Details of the preliminary ditch sump design are shown in Figure 2.11.

5. Leaching of ore may involve one or more cycles of solution application. The initial application of solution could be applied to fresh ore over a period of 30 to 120 days. The actual number of leach cycles would be determined relative to operational considerations and characteristics of the particular ore being leached.

6. The processing circuit would be designed for zero-discharge in accordance with RWQCB requirements. All processing solutions would be recycled. Because of the dry desert environment, make-up water would be necessary to replace evaporation losses and moisture retained by ore on the heap. Solution flows would be monitored on a routine basis and water added as needed.



NOT TO SCALE

NOTE:
THIS CROSS SECTION IS INTENDED TO SHOW TYPICAL DITCH CONFIGURATION DETAILS FOR PUBLIC INFORMATION PURPOSES AND EIS/EIR EVALUATION. ACTUAL CONFIGURATIONS FOR THE BRIGGS PROJECT WILL BE SUBJECT TO APPROVAL BY THE RWQCB BASED ON ENGINEERING PERFORMANCE STANDARDS THAT MEET STATE REGULATIONS (CCR TITLE 23, CHAPTER 15).

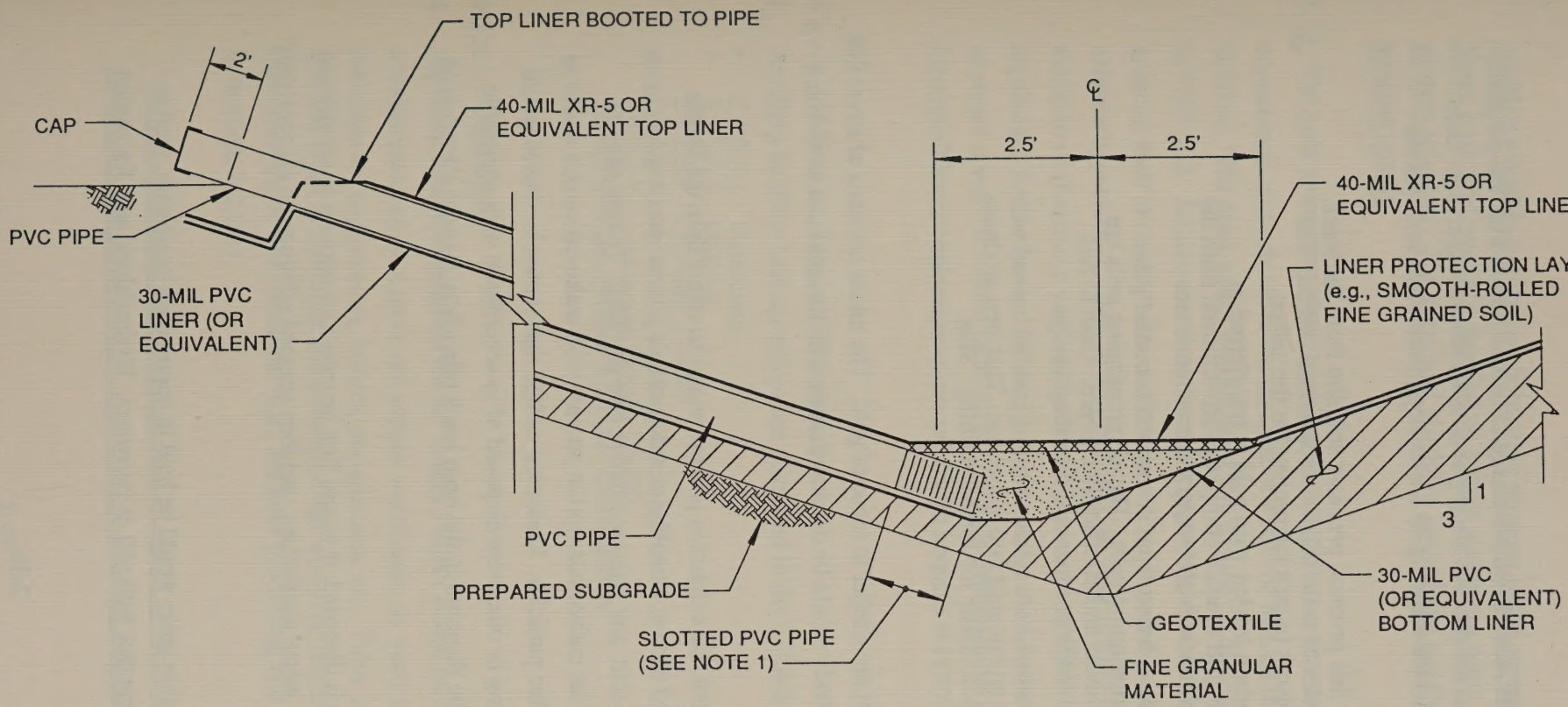
REFERENCE: ADAPTED FROM WESTEC, INC., 1993c.

FIGURE 2.10

PRELIMINARY PIPING DITCH CROSS SECTION

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NOTES:

1. WRAP SLOTTED PORTION OF PVC PIPE WITH FILTER FABRIC TO PREVENT ENTRY OF FINE PARTICLES INTO PIPE.
2. SOLUTION COLLECTION PIPES NOT SHOWN FOR CLARITY.
3. THIS CROSS SECTION IS INTENDED TO SHOW TYPICAL DITCH CONFIGURATION DETAILS FOR PUBLIC INFORMATION PURPOSES AND EIS/EIR EVALUATION. ACTUAL CONFIGURATIONS FOR THE BRIGGS PROJECT WILL BE SUBJECT TO APPROVAL BY THE RWQCB BASED ON ENGINEERING PERFORMANCE STANDARDS THAT MEET STATE REGULATIONS (CCR TITLE 23, CHAPTER 15).

REFERENCE: ADAPTED FROM WESTEC, INC., 1993c.

NOT TO SCALE

FIGURE 2.11

PRELIMINARY PIPING DITCH SEEPAGE DETECTION SUMP DETAILS

BRIGGS PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

2.2.2.4 Gold Recovery

1. The gold processing plant would receive and process gold-laden solution from the pregnant pond and would be located near the process water ponds as shown in Figure 2.3. Gold would be extracted and prepared for shipping by a four step process that includes the following:

   - **Carbon Adsorption** - In this process, pregnant solution from the leach pad is moved through a series of tanks filled with activated carbon. The gold cyanide complexes adsorb (attach themselves) to the carbon.
   - **Carbon Desorption** - Carbon loaded with gold is transferred to stripping vessels where the gold cyanide complexes are removed from the carbon by a caustic solution under high temperature and pressure.
   - **Electrowinning** - The strip solution from desorption is cooled prior to introduction to the electrowinning cells. The electrowinning cells are packed with steel wool cathodes and electrically charged. Gold is then plated onto the steel wool, which produces gold-bearing sludge.
   - **Refining** - The sludge obtained from electrowinning is dried, mixed with fluxes, melted in a furnace and poured into a doré bar. This step produces a gold doré, which is shipped offsite for further refining. Slag (a by-product of gold recovery) is shipped offsite for reprocessing or appropriate disposal.

   Metallurgical properties of silver are similar to those of gold. The minor amounts of silver that occur in the Briggs Project ore body would be extracted along with the gold and would be a component of the doré.

2. The barren solution resulting from this extraction process would be returned to the barren solution pond for reuse. Stripped carbon would be transferred to a carbon reactivation circuit where it would be washed with acid, and sized to remove fine particles. The reactivated carbon would then be reused in the carbon adsorption process with make-up carbon added as needed to replace the removed fine particles. Undersize carbon that cannot be reused would be shipped offsite for reprocessing or otherwise disposed of in accordance with applicable regulations. Carbon would not be disposed in the heap leach pile where it could adsorb gold from leaching solution.

3. If slag from the refining process is disposed, it would first be tested for toxicity in accordance with state and federal hazardous waste regulations, and then shipped offsite to an appropriately permitted disposal facility.

4. Slag or fine carbon stored in outside areas would be held in appropriate containers, such as covered steel drums, to prevent contact with soil or rainwater. Hydrochloric acid for carbon

washing would be segregated from other reagents in the storage area by containment systems. Spent wash acid would be handled on a lined area in the plant, separated from other process solutions. The spent acid would be neutralized and then recycled into the process solution circuit.

4. 5. The gold processing plant would be constructed on a concrete slab surrounded by a containment curb. Some of the equipment would be located in a pre-engineered metal building. The plant would encompass approximately 6,500 square feet as indicated in Table 2.2. Adjacent to the processing plant, there would be storage areas for reagents such as caustic soda, sodium or calcium cyanide, acid, activated carbon, calcium hypochlorite, lime, hydrogen peroxide, and melting flux. Reagents would be stored in conformance with applicable requirements of MSHA, RWQCB, and state regulations for the storage of hazardous materials. Areas where hazardous liquids are used or stored would be curbed or diked to contain potential spills and provide separation from incompatible materials.

2.2.2.5 Ancillary Facilities and Operations

1. Ancillary facilities and operations are discussed in the following sections:
   - 2.2.2.5.1 - Structures
   - 2.2.2.5.2 - Utilities
   - 2.2.2.5.3 - Drainage Control
   - 2.2.2.5.4 - Mobile Equipment and Supplies
   - 2.2.2.5.5 - Access and Project Traffic
   - 2.2.2.5.6 - Clay Borrow for Liner Construction

2.2.2.5.1 Structures

1. Ancillary structures required for the Briggs Project would include administration offices, a maintenance shop, a parts and supply warehouse, an assay laboratory and other smaller buildings for compressors, boilers, pumphouses, etc. Table 2.2 provides an estimate of the size and types of buildings and structures that would be required, including those described in other sections of this document (e.g., the gold processing and reagent storage areas described in Section 2.2.2.4).

TABLE 2.2

ESTIMATED SIZES AND TYPES OF BUILDINGS AND STRUCTURES

BUILDING/ STRUCTURE	DESCRIPTION/FUNCTIONS	APPROXIMATE SIZE (square feet)
Project Administration Office	Administrative offices, employee use areas (e.g. lunch rooms, meeting rooms).	4,500
Mine Shop/Warehouse	Equipment maintenance bays, maintenance shop, part and supply storage, maintenance offices, employee use areas.	8,000
Gold Processing	Enclosed and open structures for carbon columns, carbon stripping, regeneration, and gold recovery.	6,500
Reagent Storage	Partially enclosed (e.g., roofed) storage area for reagents.	3,000
Laboratory	Metallurgical laboratory for onsite assaying of gold values in ore and waste rock.	2,200
Crushing Plant	Open structures for primary, secondary and tertiary crushers.	10,000 (total)
Generators	Power generation.	3,500
Miscellaneous	Pump houses, etc.	3,000 (total)

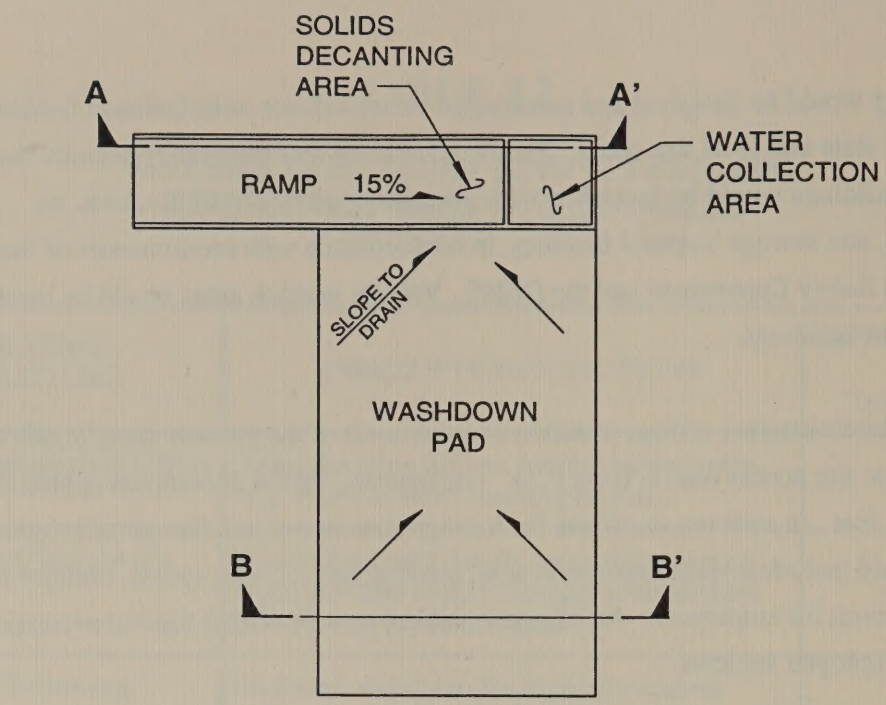
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2. The buildings would be designed and constructed in accordance with Uniform Building Codes (UBCs), and state and local fire codes. Required building and occupancy permits would be obtained. Buildings would be furnished with necessary water, electricity, heat, air conditioning, and sewage disposal facilities, in conformance with requirements of the County Building and Safety Department and the DEHS. Vehicle parking areas would be located adjacent to the buildings.

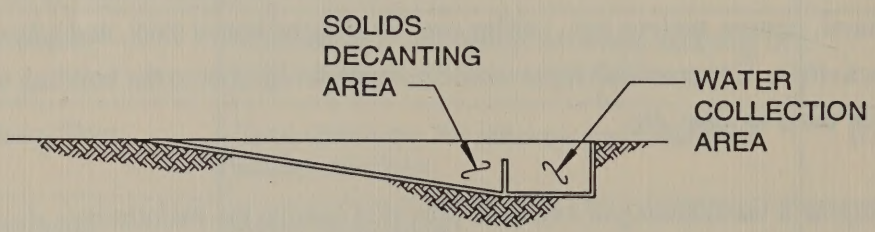
3. The project administration offices would be located north of the process water ponds area adjacent to the site access road (Figure 2.3). The building would encompass approximately 4,500 square feet. In addition to offices for management personnel, the administration building would include a visitor reception area, meeting and training rooms, sanitary facilities and a lunch room for employees. An adjacent parking area would be sized to accommodate visitor and employee vehicles.

4. The mine maintenance shop and warehouse would be located within one building totaling about 8,000 square feet. The maintenance shop would include several repair bays for light and heavy duty equipment. Provisions would be included for maintenance and repair of mobile equipment, pumps, motors, etc., cutting and welding of heavy steel, and other maintenance activities. Concrete slab areas would be located adjacent to the building with lean-to roofs for parts storage, etc.

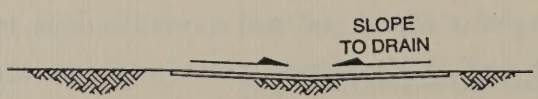
5. A concrete equipment washdown pad would be provided outside the maintenance shop for cleaning equipment. Washdown would occur with a high pressure water hose. The concrete pad would be curbed and/or sloped to contain runoff, which would be directed to an adjacent concrete decant structure where soils would be separated from the washdown water (Figure 2.12). Soil would be periodically removed from the decant structure, placed over a lined area (e.g., the washdown pad or a leach pad) and allowed to drain, and then tested and disposed of in accordance with applicable regulations ~~placed on the waste rock dumps or leach pad~~. Water from the decant structure that is not evaporated would be pumped into a water truck and recycled. If this water is used for dust control, water quality analysis would be conducted to assure that the water chemistry is appropriate for this use. An in-line separator, skimmer or other provision for removal of oil and grease from washdown water would be provided, if necessary. Separated oil and grease would be handled and stored in accordance with applicable regulations. It would be periodically shipped offsite for recycling at an appropriate licensed facility.



PLAN VIEW



SECTION A-A'



SECTION B-B'

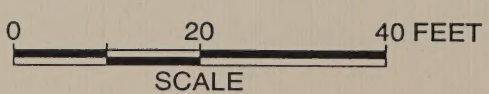


FIGURE 2.12

EXAMPLE WASHDOWN PAD CONFIGURATION

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6. A fuel and oil storage tank farm and an equipment-ready line would be located outside the maintenance shop. Fuel and oil storage tanks would be aboveground, and located within an earthen dike area sized to contain at least 110 percent of the largest tank. Construction and placement of fuel and oil storage tanks would occur in accordance with applicable state regulations. Stored materials would include diesel fuel, gasoline, lube and hydraulic oils and antifreeze. In accordance with state requirements, used oil would be stored in compliance with hazardous waste regulations and hauled offsite and recycled by a licensed recycler. Within the maintenance shop a designated area would be controlled for the storage of hazardous waste (e.g., spent solvent and rags) in accordance with applicable regulations.

7. The warehouse and an adjacent yard area would be used to store dry goods such as tools, equipment parts, pumps, etc., and small containers and drums of oil and other products required for maintenance activities. A drum storage area with controlled drainage would be provided for lube and hydraulic oils. Weather resistant inventory such as piping, tires, etc., would be stored outdoors.

8. The laboratory building would encompass about 2,200 square feet. The laboratory building would include sample preparation (e.g., crushing and splitting) equipment, drying ovens, assay furnaces, vapor hoods and other equipment for assaying ore samples, process solutions, etc. Emissions control equipment would be provided in accordance with requirements of the APCD. Assay by-products from the metallurgy laboratory would generally be neutralized and recycled into the process circuit. If small quantities of hazardous waste are generated, those materials would be handled separately and disposed of in accordance with applicable regulations.

2.2.2.5.2 Utilities

1. Because the Briggs Project site is located in a relatively remote area, utilities such as water, power, and communications, and services such as sewage would be constructed and operated by Canyon.

Solid Waste

1. The Briggs Project would generate solid and liquid wastes from construction, operation and maintenance of equipment and processing facilities. Wastes would be stored and recycled or

disposed of in accordance with rules and regulations set forth by the DEHS and in a manner acceptable to the BLM. Examples of waste types generated and the planned/available means of disposal are shown in Table 2.3.

2. Domestic wastes would be stored in containers acceptable to BLM and designed to exclude wildlife. Options for disposal of solid waste include hauling the waste to one of the following locations:
   - Lone Pine Landfill, which is located about 70 miles from the project site.
   - Homewood Canyon Transfer Station, located approximately 28 miles south of the project site. However, Homewood Canyon does not accept construction or demolition debris; consequently, this waste would have to be hauled elsewhere.
   - Ridgecrest Sanitary Landfill located in Kern County, approximately 60 miles southwest of the project site. Kern County accepts out-of-county wastes on a case-by-case basis and would require an agreement between Canyon and the Board of Supervisors.
   - Trona - Argus Landfill located in San Bernardino County approximately 15 miles southwest of the project site. San Bernardino County accepts out-of-county waste on a case-by-case basis, with approval of the Board of Supervisors.

3. In the later stages of the project operation and as part of reclamation, Canyon may request approval from BLM and the DEHS to dispose of certain inert materials that do not need to be disposed in a municipal landfill (e.g., concrete) in the waste rock dumps. Such disposal, if allowed, could not result in impacts beyond those discussed in this document or additional analyses would be required. Hazardous waste or noninert waste would not be disposed of onsite. Canyon recognizes that onsite disposal of inert waste may not be permissible, as BLM discourages onsite disposal of waste, inert or otherwise.

4. Wastes considered hazardous that could be generated would primarily be: (1) waste oils, grease, and hydraulic fluid from vehicles; (2) solvents used for maintenance; and (3) processing chemicals and laboratory waste. Used oils and other waste hydrocarbon products would be stored in tanks or drums located in a contained area and periodically collected by a licensed recycler. Solvents and other chemicals would be stored onsite in approved containers and appropriately labeled. They would be shipped offsite to a licensed reclamation or disposal facility within appropriate time frames. All hazardous waste would be disposed of in accordance with the County Hazardous Waste Management Plan and applicable state regulations.

TABLE 2.3

PROJECT WASTE AND DISPOSAL OPTIONS

WASTE TYPE	DISPOSAL OPTION
DOMESTIC WASTE (office) • Paper • Plastic • Glass • Aluminum and Ferrous Metals • Foods/Organics Waste	Recycle as appropriate, and dispose of waste that is not recycled at an offsite Class III landfill.
CONSTRUCTION/DEMOLITION WASTE • Construction Metals • Wood • Concrete	Recycle as appropriate, and dispose of waste that is not recycled at an offsite Class III landfill. If permitted by BLM and DEHS, some inert wastes could be incorporated in the waste rock dumps.
INDUSTRIAL WASTE (potentially hazardous) • Vehicle Oil and Grease • Hydraulic Fluid • Solvents • Laboratory Waste - Acid - Cyanide - Cupels	Reused onsite or removed to an appropriate hazardous waste recycling or disposal facility.
MINING WASTES • Waste Rock • Ore Residue	RWQCB-approved onsite disposal.
OTHER WASTES • Reagent Containers • Tires	Returned to manufacturer for reuse or washed according to applicable regulations and disposed at Class III landfill. Recycled by tire recycler.

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Sewage

1. Permanent restrooms would be constructed at the laboratory, office, and mine shop. Disposal of domestic wastewater would be to septic tanks and leach fields located adjacent to these facilities. For protection of ground water resources and human health, sanitary systems would be designed and constructed according to requirements of the DEHS and Uniform Plumbing Codes. Based on current employee estimates, total wastewater flows for the leach field would be about 5,000 gallons per day (gpd). Septic systems would not be located near the western project boundary where there may be potential to affect the shallow ground water near the playa margin.

2. Portable toilets may be used in areas, such as the mine pit. Maintenance of portable toilets would be contracted to a licensed septic pumper.

Power Requirements and Supply

1. Power requirements for the Briggs Project would be needed to operate facilities such as the crushers, conveying circuit, process plant, solution circulation pumps, and ground water well pumps. There would also be small power requirements for lighting, and administration and maintenance facilities. Power requirements are estimated to peak at approximately 3,300 kilowatts (kw) and average approximately 3,000 kw.

2. Project power would be generated onsite using diesel fired engines driving electric generators. Generators would be located near the crusher facilities (the largest power consumer onsite). There would be four generator sets, each consisting of a 1,600 horsepower engine driving an approximately 1,100 kw generator. Equipment for control of emissions from the generators (i.e., oxides of nitrogen [NO_x]) would be provided in accordance with APCD requirements. Power would be distributed to onsite facilities via buried lines or overhead lines on wooden poles. Power lines would be routed along site roads and other facilities to minimize surface disturbance.

3. Aboveground diesel fuel storage tanks would be located near the generators. Diesel tanks would be installed on prepared foundations enclosed with berms adequate to contain 110 percent of the capacity ~~content~~ of the largest tanks in the event of a leak or rupture.

Water

1. Water for the Briggs Project would be needed primarily for the heap leach process and for dust control. Water would be obtained from wells located onsite. ~~near the western project boundary~~. Actual daily water requirements would vary throughout the year due to changes in temperature and evaporation. Primary water requirements are shown in Table 2.4. This table reflects the anticipated rate of pumping from the water supply wells.

2. The average rate of ground water pumping would be about 400 gpm (640 acre-feet per year). Over the eight-year period of construction, operation and reclamation of the project, constant pumping at this rate would yield approximately 5,100 acre-feet of water. Studies of ground water availability discussed in Section 3.3 indicate that this amount of water is readily available. The total amount of water that may be pumped over the life of the project represents about 0.1 percent of the amount in storage in the basin as estimated by the California Department of Water Resources (DWR). The proposed rate of withdrawal is about 2 percent of the rate at which ground water in the basin is recharged. Ground water availability and impacts of pumping are discussed in Sections 3.3 and 4.3, respectively.

3. Pumping tests have been performed on existing monitoring wells that have been installed at the site to obtain background water quality data. These pumping tests are discussed in Section 3.3.2.4. Results of the pumping tests indicate that the alluvial sediments in the site area are capable of producing adequate well yield rates to supply the project's water needs. Based on the pumping test results, water would be obtained from two approximately 200- to 300-foot deep wells (Figure 2.3) with a combined capacity of up to 750 gpm to accommodate the project's maximum instantaneous water use rate. A third well may be installed, if necessary to obtain this yield. Well pumps would be powered by electricity from onsite generators. Water would be delivered from each well site to a main pipeline and be stored in a tank (e.g., 15,000-gallon capacity), located approximately as shown in Figure 2.3.

4. As further discussed in Section 3.3, the ground water contains high concentrations of dissolved solids. Therefore, process solution make-up water, approximately 80 gpm, may be treated with lime at the make-up water pond to precipitate some of the dissolved solids. Because the climate of the area has over 30 times as much evaporation as precipitation (see Section 3.3.1.1), water added to the processing circuit is ultimately lost to evaporation; the process circuit is designed for total containment of liquids with no discharge. The amount of water that would be in the processing circuit at any given time would depend on the height of

TABLE 2.4

MAXIMUM AVERAGE AND INSTANTANEOUS WATER REQUIREMENTS

TYPE OF USE	WATER REQUIREMENTS	
	Average[1] (gallons per minute)[3]	Instantaneous[2] (gallons per minute)[3]
Process Solution (including make-up for evaporation loss and ore wetting)[4]	80	200
Dust Control	300	450
Other (e.g., potable, sanitation)	20	100
TOTAL	400[5]	750

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(1) These values apply to consumption averaged over a typical year at the maximum production rate.
(2) The instantaneous values represent the maximum consumption at any given time.
(3) To convert to gallons per day, multiply by 1,440. To convert to acre-feet per year, multiply by 1.6.
(4) Ore wetting is required to bring the ore moisture content up to its field capacity.
(5) 400 gallons per minute is approximately equal to 640 acre-feet per year, or about 600,000 gallons per day.

the ore heap, the area of the heap being actively leached, and whether or not there has been recent rainfall. Results of detailed water balances conducted (WESTEC, Inc., 1993c) are discussed in Section 2.2.2.3.3.

5. A small amount of good quality water would be required for potable needs and for carbon stripping. The total amount of water that would be required for these needs would average about 600 gpd (about 0.4 gpm). This water would be obtained by purifying water from the production wells using a small reverse osmosis unit. The reverse osmosis unit would be housed in an approximately 200-square foot building located adjacent to the water tank shown in Figure 2.3. A small tank (e.g., several thousand gallons) would be provided for storage of potable water. Residual water would be bled from the reverse osmosis unit and recycled into the ore process circuit; there would be no discharge. Use of the onsite wells and a reverse osmosis unit to provide potable water may require that a potable water system permit be obtained from the DEHS. The system would be regulated by the DEHS as a public non-transient, non-community water system. It would have to comply with all applicable state statutes and regulations, including requirements for appropriate well construction. Periodic analysis of water from the wells and potable water (after treatment) would be conducted in accordance with CCR Title 22, Chapter 15.

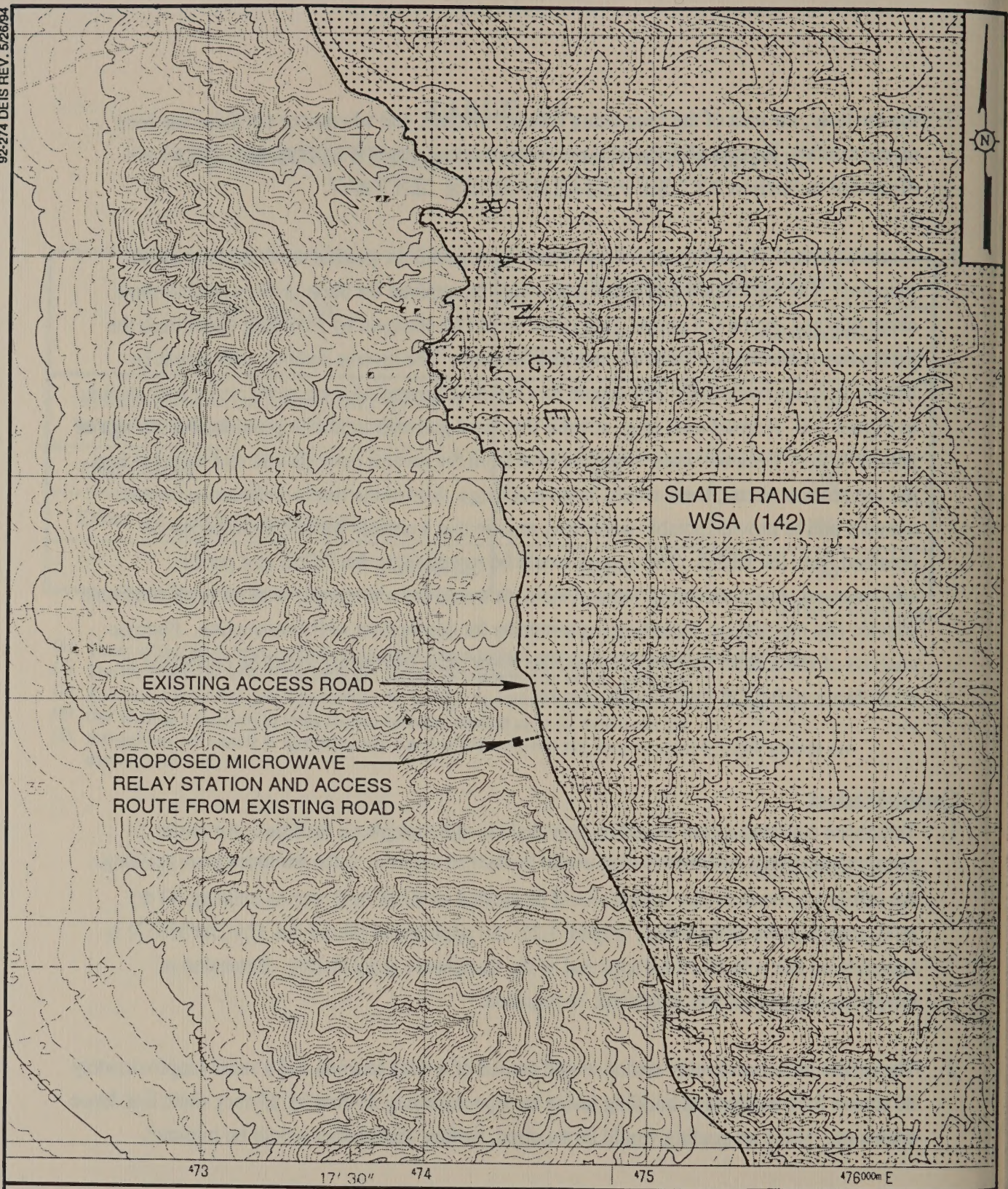
Communications

1. Telephone communication would be provided via radio telephone facilities. An onsite receiver/transmitter ~~microwave dish~~ would be located adjacent to the administration building. An offsite microwave relay station would be located on BLM land near an existing AT&T relay station in the Slate Range (Figure 1.2). An application (Serial No. CACA#30653) is currently on file with BLM for approval of the microwave relay facility. Extension of telephone lines to the site would not be required.

2. The offsite microwave relay station would consist of a relay antenna and a small (approximately 80 square foot) equipment building inside an approximately 25-foot by 25-foot chain link fence enclosure. Since no grading would be required, surface disturbance would be minimal.

3. The microwave relay site is located about 340 feet from an existing road that provides access to an adjacent AT&T station (Figure 2.13). Grading of an access way from the existing road would not occur. Access would occur by overland travel (i.e., without grading) from the

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0 2,000 4,000 FEET

SCALE

NOTE:
SEE FIGURE 1.2 FOR MICROWAVE RELAY STATION VICINITY MAP.

REFERENCE:
USGS 1:24,000 TOPOGRAPHIC MAP OF SLATE RANGE CROSSING, CALIFORNIA, DATED 1982.

FIGURE 2.13

MICROWAVE RELAY STATION LOCATION

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existing road along a corridor that would be staked so that the disturbed area is minimized. Construction of the station would take about two weeks and could require several loads of equipment. During operations, access would only be required for periodic maintenance.

4. Canyon would obtain appropriate licenses from the Federal Communication Commission (FCC) to operate the microwave system. Signal transmission would occur at the frequency assigned by the FCC to control the potential for interference with other communication systems operating in the area.

2.2.2.5.3 Drainage Control

1. The Briggs Project site is located in a very arid area that averages about 4 inches of rainfall annually. However, as for most areas of the southwest deserts, extreme dry periods are interspersed with occasional rains that can have high intensity. For example, for a 100-year recurrence interval storm, the amount of rain that may fall in a single 24-hour period has been estimated to be 2.4 inches for the site and 5.3 inches for the area of the Panamint Range upgradient from the site (WESTEC, Inc., 1993b). For a 100-year recurrence interval, as much as 1.3 inches of rain could be expected to fall within one hour (WESTEC, Inc., 1993c). Because of these extremes, drainage controls for the Briggs Project site must be conservatively designed.

2. The site and west slopes of the Panamint Range drain to Panamint Valley, a basin of interior drainage. Panamint dry lake is a playa occupying the valley. There are no permanently flowing or ephemeral streams on the project site. The primary drainage feature is Redlands Canyon, which discharges at the head of the alluvial fan and has a watershed area of about six square miles (3,840 acres). Surface flow from Redlands Canyon occurs infrequently. Canyon indicates that surface water flow has not occurred from Redlands Canyon to the alluvial fan since exploration drilling began in 1987, including the 1992-1993 year of higher than average rainfall. Based on this observation, it may typically be several years or more between events of surface flow from Redlands Canyon. However, it is recognized that during a severe storm event, surface flow from Redlands Canyon to the site could occur.

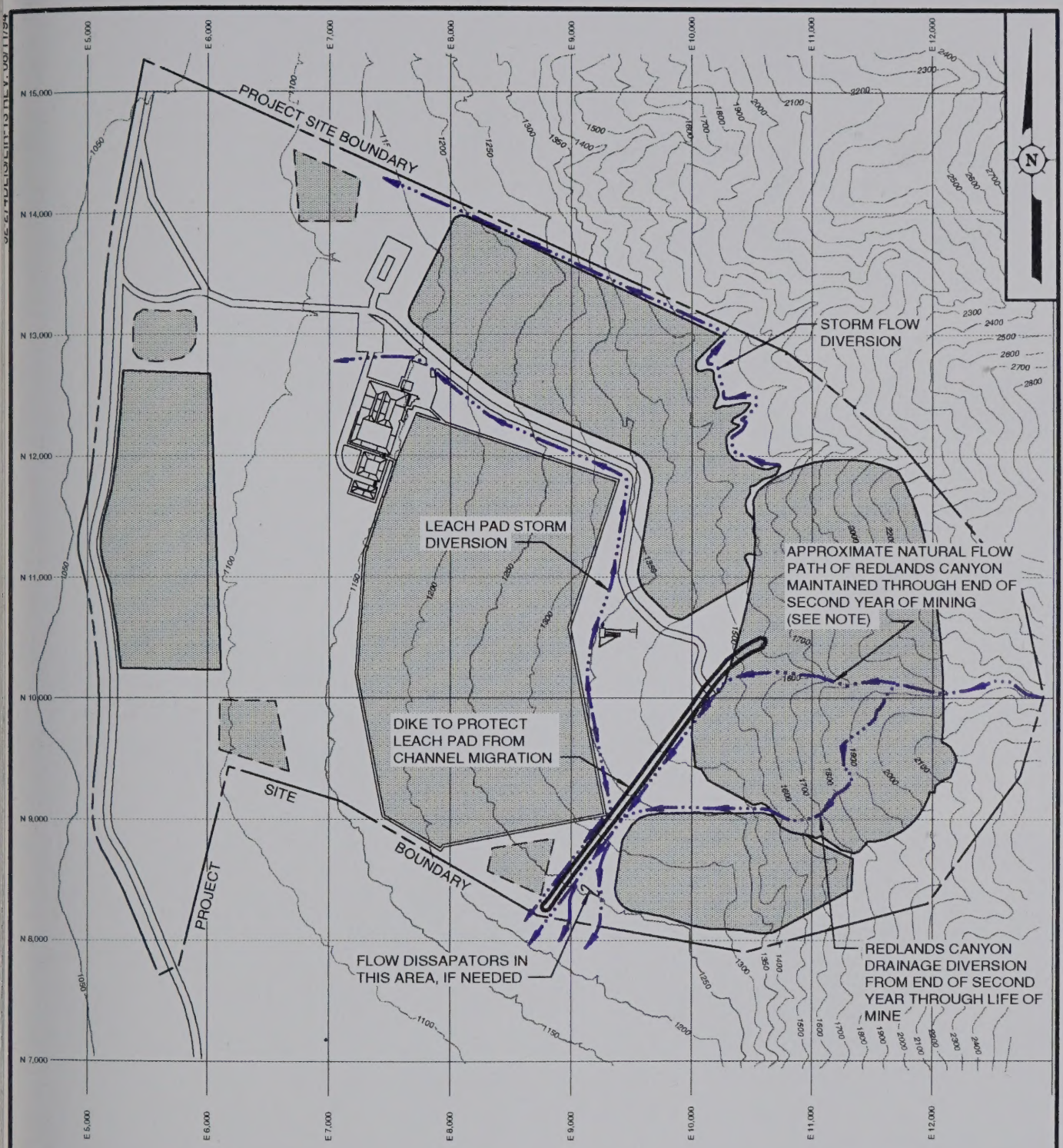
3. The mine pit would be located at the mouth of Redlands Canyon. ~~Diversion~~ Modification of the Redlands Canyon drainage path ~~around~~ where it flows through the mine pit would occur under a Clean Water Act Section 404 Permit within the jurisdiction of the COE. State 401 water quality certification, or waiver thereof, would be required pursuant to 33 CFR

Section 330.4(c). The waste rock piles would be located on the lowermost mountain slopes and onto the upper portion of the alluvial fan. Other mine facilities would be located lower on the slopes of the alluvial fan. Diversion berms and channels would be constructed to safely convey flows around site facilities. The site drainage layout is shown in Figure 2.14. Stormwater diversion facilities protecting the leach pad and reagent use areas would be designed to accommodate a 100-year, 24-hour flood event. The RWQCB would regulate stormwater runoff and the design and construction of related facilities. An NPDES permit for stormwater runoff would need to be obtained from the RWQCB.

4. During the initial portion of mining (e.g., approximately the first two years), diversion of the Redlands Canyon drainage ~~around the mine pit~~ path would not be required because of the infrequent nature of surface water flow and because the pit would not yet be a closed depression. The dike shown in Figure 2.14 would be installed as part of initial site construction to protect the leach pad area from run-on or channel migration. The aerial photograph in Figure 2.15 shows that the primary drainage path from Redlands Canyon over the alluvial fan is directed toward the southwest. The dike would approximately maintain the natural drainage path, so the location where the drainage enters the Manly Peak WSA would be approximately the same as under natural conditions. As further discussed in Section 3.3.2, maximum peak flows of up to about 9,700 cubic feet per second (cfs) could be expected from Redlands Canyon for the 100-year, 24-hour storm. The heap leach pad protection dike would be constructed of structural fill and designed to withstand this maximum peak flow while providing adequate protection to the processing area. The dike would be about 10 feet high with 2H:1V side slopes and a minimum top width of about 15 feet. Detailed engineering, flow calculations, and as-built survey control would be subject to RWQCB review.

5. Prior to the lower portion of the pit becoming a closed depression, the Redlands Canyon drainage would be diverted to the south ~~above the main~~ through the upper portion of the pit highwall. The drainage would be conveyed through a series of closed depressions or "pools" that would be excavated into the bedrock. The pools will be connected by a series of steep bedrock channels that would form cascades and would lead the surface water around the closed depression of the mine pit. Figure 2.16 shows the general planned configuration of the pit highwall and illustrates how this drainage configuration would be achieved.

6. This diversion would release surface flow along the northern side of the south waste rock pile. Large competent rock would be placed at the toe of the waste rock pile to minimize erosion. West of the south waste rock pile, the natural ground surface slope would result in spreading



NOTE:
THE APPROXIMATE EXISTING FLOW PATH OF REDLANDS CANYON WOULD BE MAINTAINED WHILE INITIAL HIGH WALL EXCAVATION OCCURS OVER THE FIRST APPROXIMATELY TWO YEARS OF MINING. PRIOR TO THE PIT BECOMING A CLOSED DEPRESSION, THE REDLANDS CANYON DRAINAGE PATH WOULD BE DIVERTED SOUTH OF THE MAIN PORTION OF THE PIT.

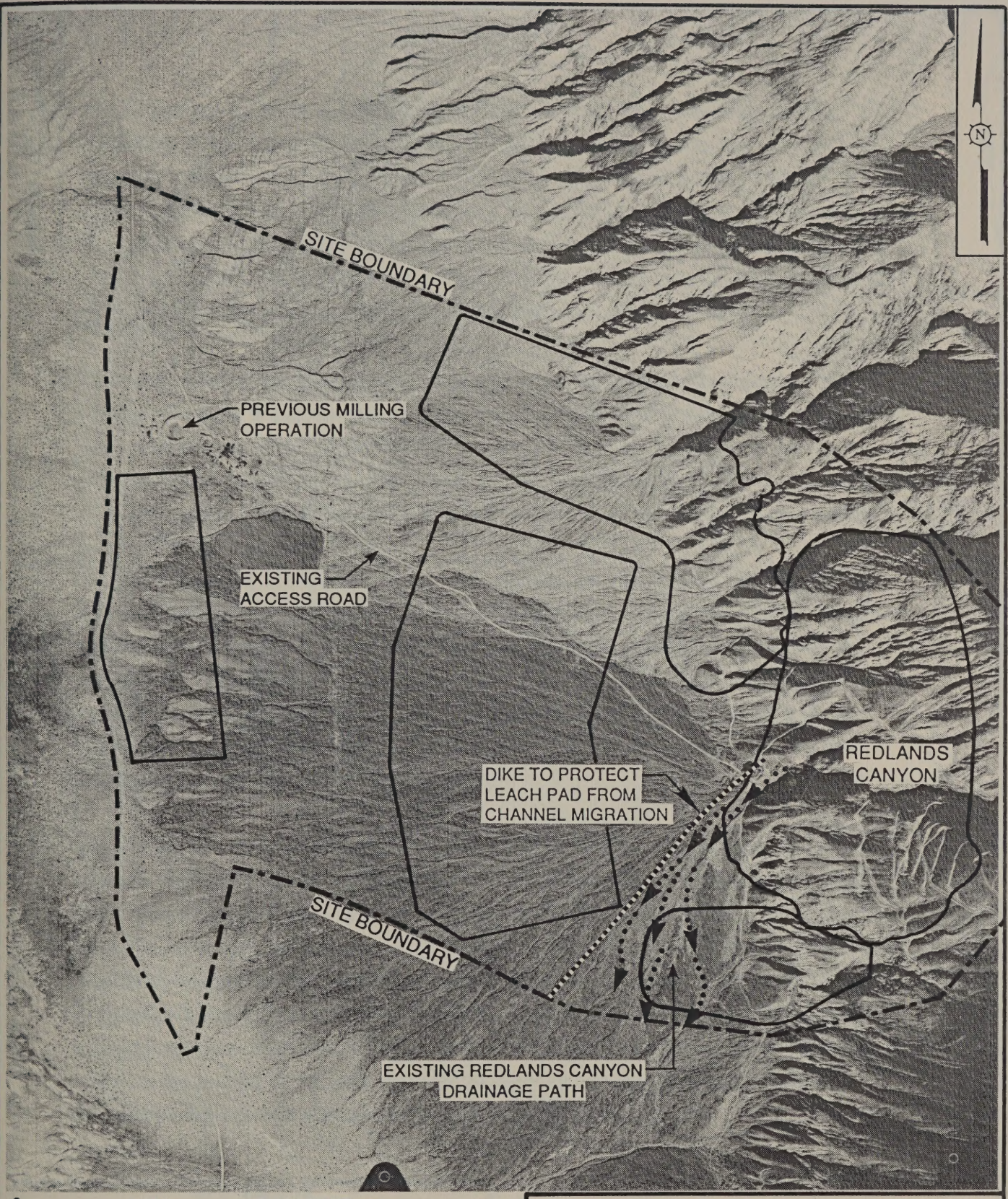
REFERENCE: CANYON, 1993b.

FIGURE 2.14

DRAINAGE PLAN

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NOTE:
FACILITY BOUNDARIES ARE APPROXIMATE DUE TO AERIAL PHOTOGRAPH DISTORTION.

REFERENCE:
AERIAL PHOTOGRAPH TAKEN BY INTRA SEARCH, DENVER, COLORADO, DATED 12/28/87.

FIGURE 2.15

EXISTING REDLANDS CANYON DRAINAGE PATH AND DIKE LOCATION

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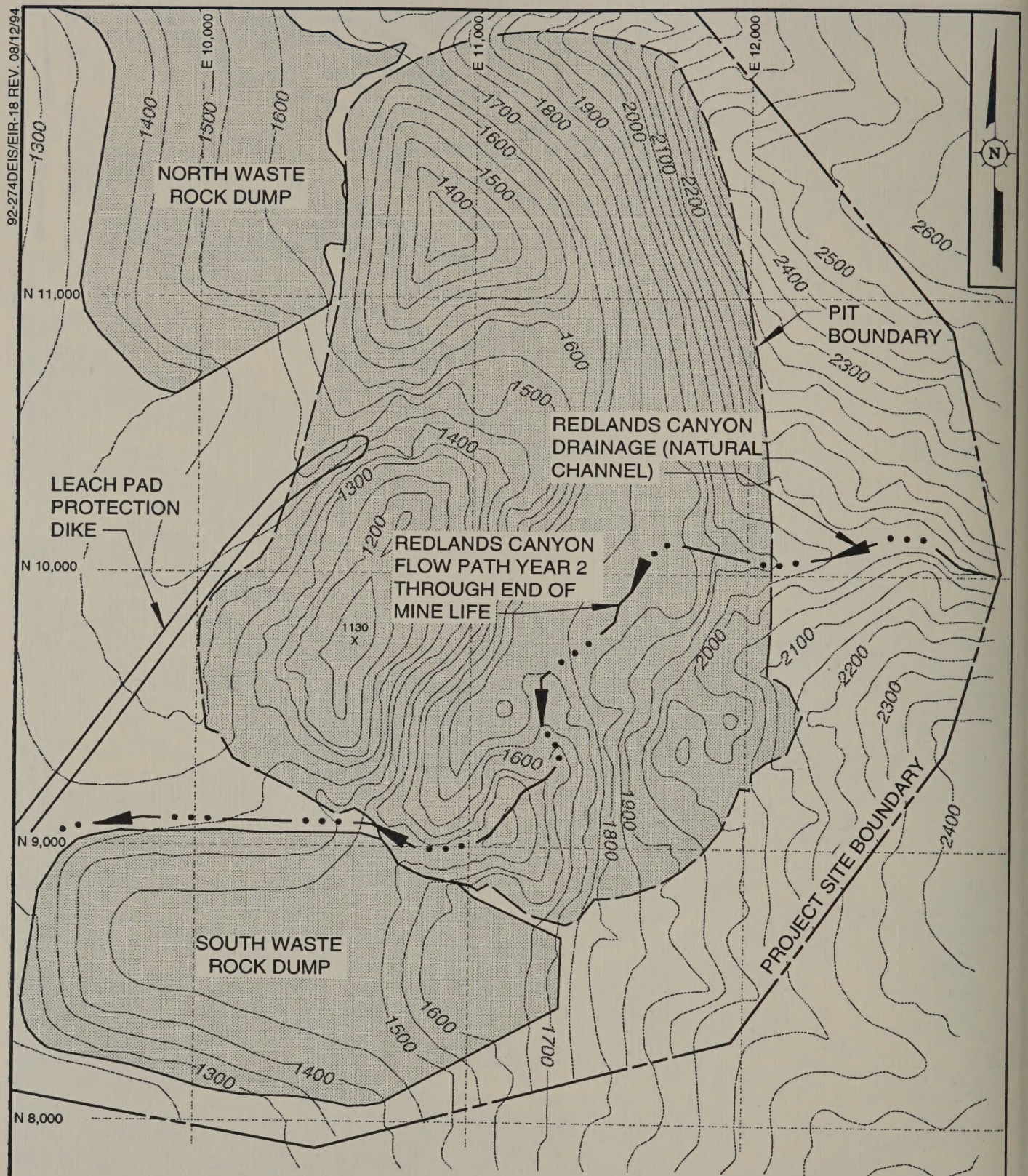


FIGURE 2.16

REDLANDS CANYON DIVERSION FLOW PATH (YEAR 2 THROUGH END OF MINE LIFE)

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REFERENCE: CANYON, 1993b.

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of flow between the dump and the leach pad protection dike. Provisions for increasing dissipation of flow energy would be provided if ground surveys indicate such measures are necessary to avoid concentration of flows. Rip-rap, rock piles, small dikes or similar measures could be used to split up flow before it leaves the site. The leach pad protection dike would also be armored with large rocks or rip-rap near this location. As for the initial phase of drainage control, the area where the Redlands Canyon drainage path enters the Manly Peak WSA would be approximately the same as under natural conditions.

7. There is no notable watershed area above the southern waste rock pile so engineered drainage above the pile is not required. The watershed areas contributing flow to the northern waste rock pile area are relatively small (i.e., a few hundred acres). Run-on to this pile would be conveyed along the inside edge of the pile to the northeast corner, and then along the north side of the pile. Large competent rock would be placed at the toe of the pile to minimize erosion.

8. A broad V-ditch, trapezoidal ditch and/or a dike would be provided immediately upgradient from the leach pad to protect the processing and reagent storage areas from run-on. This ditch would primarily drain to the north, and then west along the site access road as shown in Figure 2.14. Preliminary engineering indicates a ditch about 20 feet wide and 3 feet deep would be required. Roads, building pads, the ore stockpile area and other graded surfaces would also be constructed with appropriate drainage to control surface flow and minimize erosion for occasional rainstorms that may occur.

9. Maintenance to surface water control facilities would occur on an as-needed basis. Drainage channels and dikes would be inspected after rainfall events resulting in substantive surface flow. If areas are observed where excessive erosion or siltation is occurring, maintenance would be performed. Maintenance, if necessary, could include the use of heavy equipment to reestablish appropriate channel grades or repair erosion of dikes. For the Redlands Canyon drainage path, this maintenance work would require a permit from the COE. If substantial surface flows occur during the life of the Briggs Project, it is expected that alluvium would collect in the pools in the bedrock above the pit highwall and may need to be removed. It would be dug out with a loader and deposited on the waste rock piles.

2.2.2.5.4 Mobile Equipment and Supplies

Equipment

1. An array of mine equipment and service vehicles would be used for the site operation. Anticipated equipment requirements are shown in Table 2.5. Actual equipment used could vary to accommodate mining conditions. Front end loaders, end dump trucks, track dozers, blasthole drills, road graders, and water trucks would be used in operation of the mine, heap leach facility, and for onsite dust control. Support vehicles and equipment would include an explosives truck, service truck, fuel truck, and welding truck. Several vehicles would be onsite for personnel use. A dedicated emergency medical technician (EMT) vehicle would also be available in the event of injury.

Supplies

1. Major operating supplies for the project would include fuels, oils, reagents and explosives. The major operating supplies and their anticipated usage rates, storage quantities and primary storage locations are included in Table 2.6. Actual usage rates of most supplies would vary seasonally and over the life of the project, depending on haul distances, production rates, weather conditions, and other factors affecting mine operations.

2. Storage facilities for reagents (e.g., cyanide, hydrochloric acid, etc.) will include secondary containment for spills. Tanks for storage of fuels and oils would be installed on prepared foundations enclosed with berms adequate to contain the contents of the tanks in the event of a leak or rupture.

3. Storage and use would occur in conformance with applicable regulations.

2.2.2.5.5 Access and Project Traffic

Onsite Roads

1. Onsite roads would connect the major facilities. Ore haul roads would be about 60 feet wide to permit two way traffic. Safety berms would be provided in accordance with MSHA requirements. The grade would not generally exceed 10 percent except for short pitches. Within the mine pit, haul roads would be incorporated into the benching configuration as excavation proceeds. Outside the pit, haul roads would be constructed using standard cut and fill balances. A typical cross section for haul roads outside the pit is shown in Figure 2.17. Road designs will incorporate drainage dips and turnouts, where appropriate.

TABLE 2.5

ESTIMATED CONSTRUCTION AND OPERATIONS EQUIPMENT REQUIREMENTS

TYPE	SIZE	QUANTITY
Front End Loader	13.5 cubic yard class	2
End Dump Truck	85-ton class	4 to 8
Track Dozer	370-horsepower class	4
Blasthole Drill	35,000-pound class	2
Road Grader	275-horsepower class	1
Water Truck	10,000-gallon class	1
ANFO Explosives Truck	10,000 pound	1
Service Truck	2 ton	1
Fuel Truck	3,000 gallon	1
Welding Truck	1 ton	1
Pick-up Trucks/ Personnel Vehicles	1/2 to 3/4 ton	20
EMT Vehicle	3/4 ton	1

92-274 (4/29/95/cm)

NOTE: The actual sizes and numbers of the equipment employed may vary depending on availability, economics, and mining conditions. Other similar equipment may also be added during the life of the mine as needed in response to operating conditions.

TABLE 2.6

MAJOR OPERATING SUPPLIES

ITEM	PRIMARY USE	ESTIMATED MONTHLY CONSUMPTION(1)	AMOUNT STORED ONSITE(1)	PACKAGING/STORING	PRIMARY STORAGE LOCATION
Lime	Process Solution pH Control and Ore Agglomeration	540 tons	100 tons	Bulk/Silo	Crushing Area and Reagent Storage at Solution Pond Area
Sodium or Calcium Cyanide	Leaching Agent	110 tons or 25,000 gallons	42,000 pounds or 25,000 gallons	Briquettes or Granular/Bins or Liquid Solution/Tank	Reagent Storage at Solution Pond Area
Anti-Scalant	Pipe Maintenance	540 gallons	2,000 gallons	Bulk/Tanks	Solution Pond Area
Caustic Soda	Carbon Desorbtion	6,000 pounds	20,000 pounds	50-Pound/Bags	Reagent Storage at Solution Pond Area
Niter	Fluxing Agent	300 pounds	5,000 pounds	50-Pound/Bags	Gold Processing Plant
Silica	Fluxing Agent	300 pounds	5,000 pounds	50-Pound/Bags	Gold Processing Plant
Fluorspar	Fluxing Agent	300 pounds	5,000 pounds	50-Pound/Bags	Gold Processing Plant
Borax	Fluxing Agent	300 pounds	5,000 pounds	50-Pound/Bags	Gold Processing Plant
Litharge	Fire Assaying	300 pounds	1,000 pounds	100-Pound/Cans	Laboratory
Hydrochloric Acid	Carbon Stripping	300 pounds	500 gallons	Drum or Tank	Gold Processing Plant
Activated Carbon	Carbon Adsorbtion	1,500 pounds	40,000 pounds	Bulk/Bags	Gold Processing Plant
Anhydrous Ammonia	NO_x Scrubbing	11,300 pounds	10,000 pounds	Bulk/Tanks	Power Generating Station
Motor Oil	Equipment Lubrication	1,000 gallons	1,000 gallons	Bulk/Tanks	Shop/Warehouse Yard
Diesel Fuel	Mobile Equipment, Power Generation, Explosives Production	365,000 gallons	75,000 gallons	Bulk/Tanks	Shop/Warehouse Yard and Power Generating Station
Gasoline	Light Mobile Equipment	15,000 gallons	3,000 gallons	Bulk/Tanks	Shop/Warehouse Yard
Hydraulic Oil	Hydraulic Equipment	1,000 gallons	3,000 gallons	Bulk/Tanks	Shop/Warehouse Yard
Gear Lube	Equipment Lubrication	1,000 gallons	3,000 gallons	Bulk/Tanks	Shop/Warehouse Yard

(1) Based on processing 4 million tons per year. Actual volume would vary with ore characteristics and operating conditions.

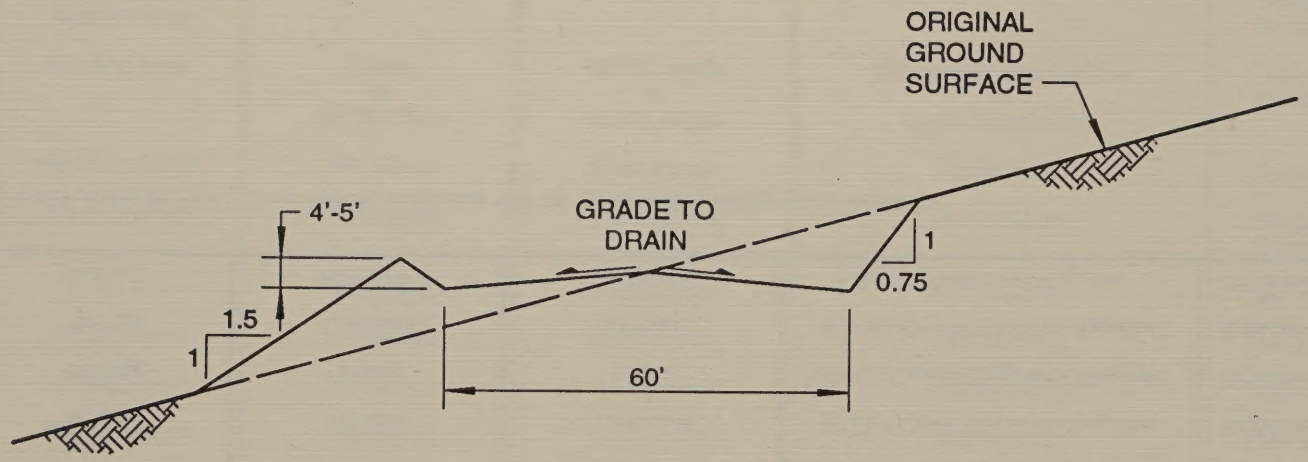
TABLE 2.6

MAJOR OPERATING SUPPLIES
(Continued)

ITEM	PRIMARY USE	ESTIMATED MONTHLY CONSUMPTION(1)	AMOUNT STORED ONSITE(1)	PACKAGING/STORING	PRIMARY STORAGE LOCATION
Brake Oil	Equipment Brakes	1,000 gallons	3,000 gallons	Bulk/Tanks	Shop/Warehouse Yard
Other Oils	Equipment Lubrication	1,000 gallons	3,000 gallons	Bulk/Tanks	Shop/Warehouse Yard
Propane	Furnaces, Boilers	7,000 gallons	5,000 gallons	Bulk/Tanks	Gold Processing Plant, Laboratory, Shop/Warehouse and Office
Antifreeze	Engine Coolant	1,000 gallons	3,000 gallons	Bulk/Tanks	Shop/Warehouse Yard
Ammonium Nitrate	Explosives Production	190 tons	50 tons	Bulk Granular or Prill/Silo	Explosives Storage Area
Down Hole Delays (blasting caps)	Blasting	2,500 each	4,500 each	100 each Cases/Explosives Magazine	Explosives Storage Area
Surface Delays	Blasting	625 each	1,500 each	80 each Cases/Explosives Magazine	Explosives Storage Area
Electric Caps	Blasting	15 each	40 each	50 each Cartons/Explosives Magazine	Explosives Storage Area
One Pound Primers	Blasting	2,500 each	3,000 each	60 each Cases/Explosives Magazine	Explosives Storage Area
Detonation Cord	Blasting	55,000 feet	70,000 feet	Spools/Explosives Magazine	Explosives Storage Area

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(1) Based on processing 4 million tons per year. Actual volume would vary with ore characteristics and operating conditions.



NOT TO SCALE

FIGURE 2.17

TYPICAL HAUL ROAD CROSS SECTION

BRIGGS PROJECT

REFERENCE: CANYON, 1993b.

ENVIRONMENTAL SOLUTIONS, INC.

2. Onsite access roads are classified into two categories based on the level of use. Typical cross sections for Class 1 and Class 2 access roads are shown in Figure 2.18.

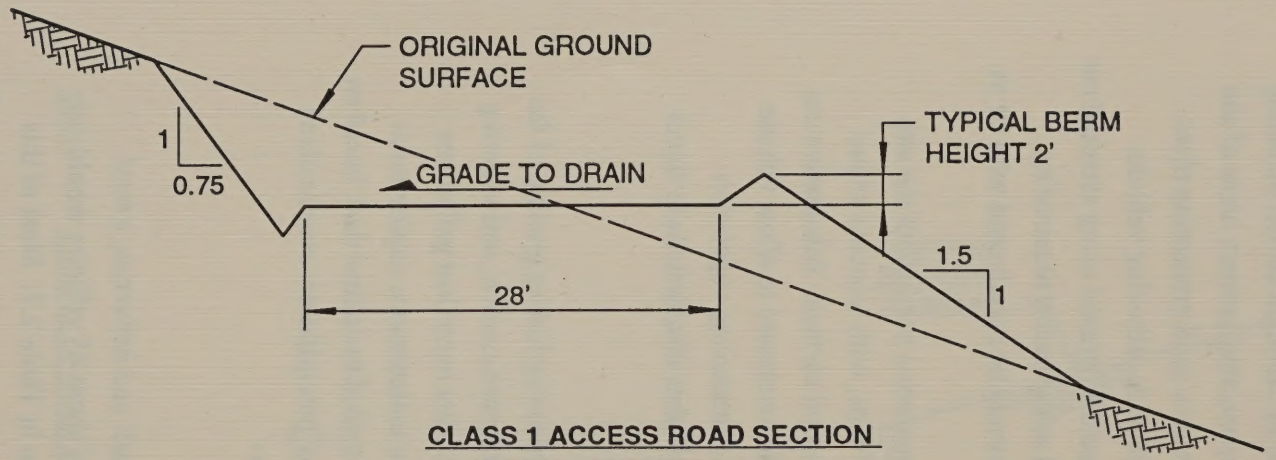
3. Class 1 access roads are those that would be routinely traversed by common traffic, including the access route into the mine from Wingate Road, and roads connecting primary areas of site activity such as the administration offices, the shop/warehouse area, gold processing plant, process water ponds, etc. Class 1 roads would be about 28 feet wide, allowing vehicles traveling in opposite directions to pass safely. These roads would be graded using standard cut and fill procedures to provide a smooth traveling surface, with safety berms required by MSHA regulations. Location and configuration of the berms would be coordinated with BLM.

4. Class 2 roads would be low use roads, for example, to reach nonactive portions of the site like monitoring stations. These roads would be about 12 feet wide, with turnouts where necessary. These roads would be graded along the existing ground surface. Substantive cut or fill would not occur except possibly for short segments where necessary to allow vehicle passage. Construction of these roads would primarily consist of removing vegetation and manipulating the ground surface so that large boulders and other obstructions to travel are removed.

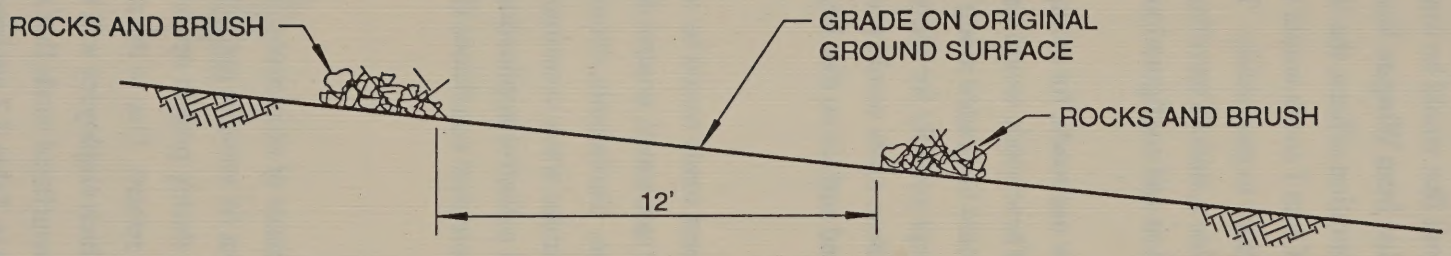
5. Haul roads and Class 1 access roads would be regularly maintained including grading of the road surface to provide for safe travel, control drainage and minimize erosion, and watering to minimize dust generation. Surfactants, chemical binders or other extra dust palliatives would also be used to minimize water consumption and reduce maintenance requirements. Frequency of watering and palliative application would be as needed to control dust, based on traffic volume and meteorological conditions (i.e., wind speed, precipitation, evaporation).

Project Traffic

1. Based on preliminary estimates of employees, management staff, and deliveries, a ~~total~~ weekday maximum of about 65 vehicles and a daily average of about 45 vehicles ~~would~~ may be expected ~~each weekday~~ during project operations, as shown in Table 2.7. Most of this traffic would be employee-related. Due to the remote location of the site, the relatively small population centers from which employees will be commuting, the common hours for employee shifts, and the unsurfaced roads that must be traveled, a high degree of ride sharing is expected. The estimates in Table 2.7 are based on two to three employees per vehicle. On weekends, traffic would be less than shown on the table.



CLASS 1 ACCESS ROAD SECTION



CLASS 2 ACCESS ROAD SECTION

FIGURE 2.18

TYPICAL ACCESS ROAD CROSS SECTIONS

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NOT TO SCALE

REFERENCE: CANYON, 1993b.

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TABLE 2.7

ESTIMATED ~~WEEKDAY~~ TRAFFIC FOR MINE OPERATIONS(1)

TRAFFIC SOURCE	WEEKDAY MAXIMUM		AVERAGE	
	Vehicles	~~Average Daily Traffic(2)~~ One-Way Trips(2)	Vehicles	One-Way Trips(2)
EMPLOYEE TRAFFIC				
• Mining/Processing Staff and Visitors Using Individual Vehicles	50	100	36	72
• Management Staff	10	20	5	10
EQUIPMENT/SUPPLY DELIVERIES	5	10	4	8
TOTAL	65	130	45	90

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(1) For a short period during construction when activities are at a maximum, traffic could be approximately double the operations phase traffic provided in this table.
(2) Trips to and from the site.

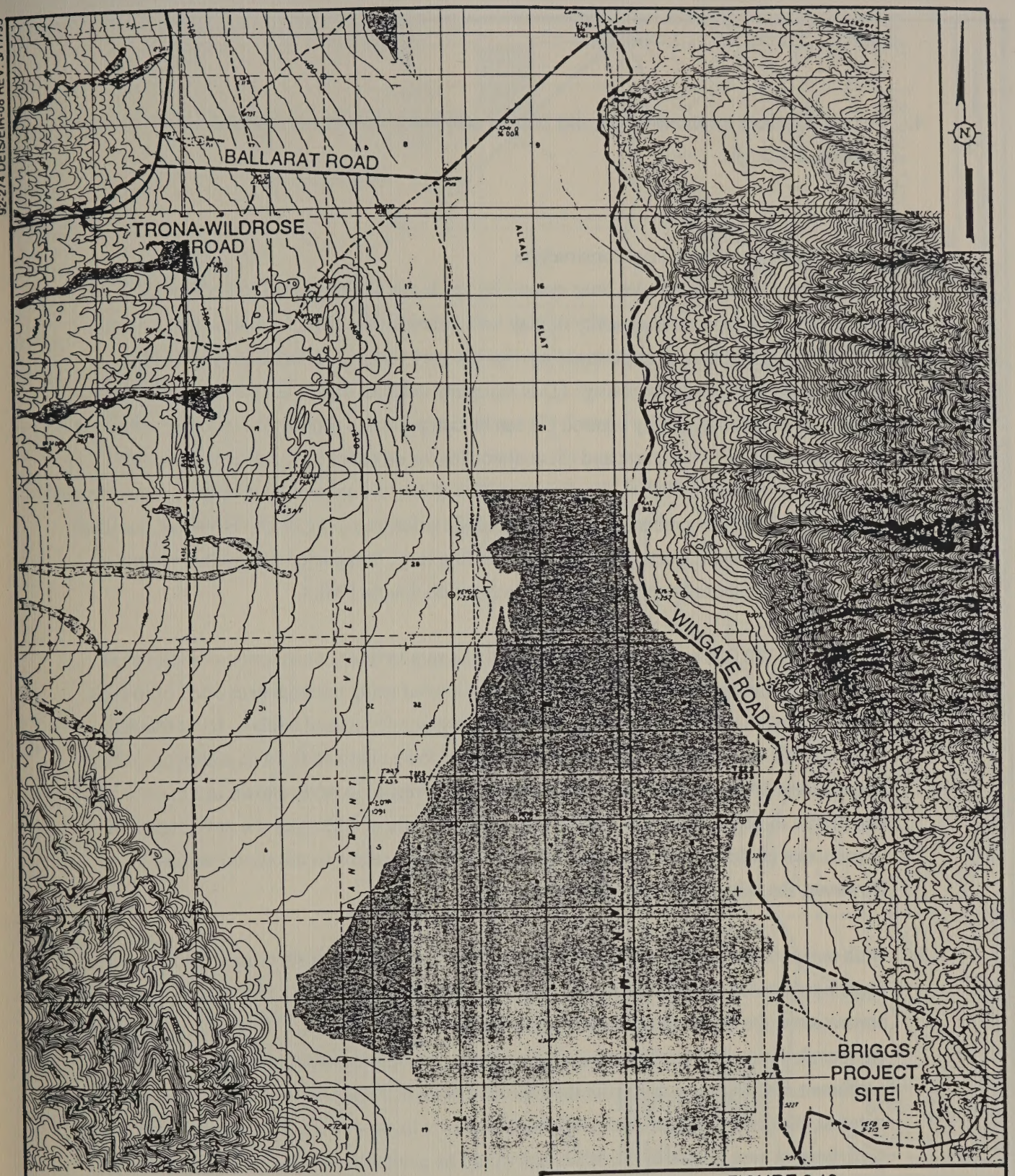
2. During the initial construction phase, mining equipment and construction supplies would be imported to the site. Total employees (approximately 155) would be somewhat greater than during the operations stage. The duration of construction is estimated at approximately six to eight months. For a short period during construction when activities are at a maximum, daily traffic could be up to double the operations traffic shown in the table.

Access

1. Panamint Valley can be accessed from the east (Death Valley), west (Lone Pine/Independence), and south (Ridgecrest/China Lake). The majority of project employees are expected to live in the Ridgecrest/China Lake area (Kern County) south of the Briggs Project site, the only sizable community in the region. Ridgecrest (Figure 1.1) is about 60 road miles southeast of the site. Access to the site from Ridgecrest is via California Highway 178 east about 25 miles to the community of Trona, continuing north about 23 miles on Trona-Wildrose Road to the Ballarat turnoff and then over dirt roads. The dirt roads that would be used for site access are Ballarat Road (Figure 2.19) and Wingate Road, which are maintained by Inyo County. Some employees could also reside in Trona (San Bernardino County).

2. A few project employees may reside in Inyo County, although the distances to communities such as Lone Pine and Independence (about 70 and 90 miles, respectively) are long for daily commuting. Access from Independence and Lone Pine is south on U.S. Highway 395, then east 12 miles on Highway 136 and 36 miles on Highway 190, and then 15 miles south on Panamint Valley Road to the Ballarat turnoff.

3. Surface and driving conditions on the dirt roads to the site are further discussed in Section 3.10. The Proposed Action does not include widening or straightening of these dirt roads, but the road surface would be improved where required. The scope of improvements included as part of the Proposed Action includes only minor measures to smooth the existing road surface; for example, removing any large rocks that may be present, providing a thin (e.g., up to several inches) veneer of soil in rough spots, and/or compacting the roadbed. Canyon would enter into an agreement with the County for maintenance of these roads. As further discussed in Section 3.7, much of the area adjacent to Ballarat and Wingate roads is WSA. The WSAs adjacent to the road include Manly Peak, Middle Park Canyon, and Slate Range. Work for the proposed surface improvements and maintenance would not occur beyond the existing limits of surface disturbance where WSAs abut the road.



0 5,000 10,000 FEET

SCALE

REFERENCE:
7.5 MINUTE TOPOGRAPHIC MAPS OF BALLARAT, MANLY FALL, SLATE RANGE CROSSING, AND MATURANGO PEAK SE, CALIFORNIA, DATED 1988, 1984, 1982 AND 1982 RESPECTIVELY.

FIGURE 2.19

SITE ACCESS ROAD

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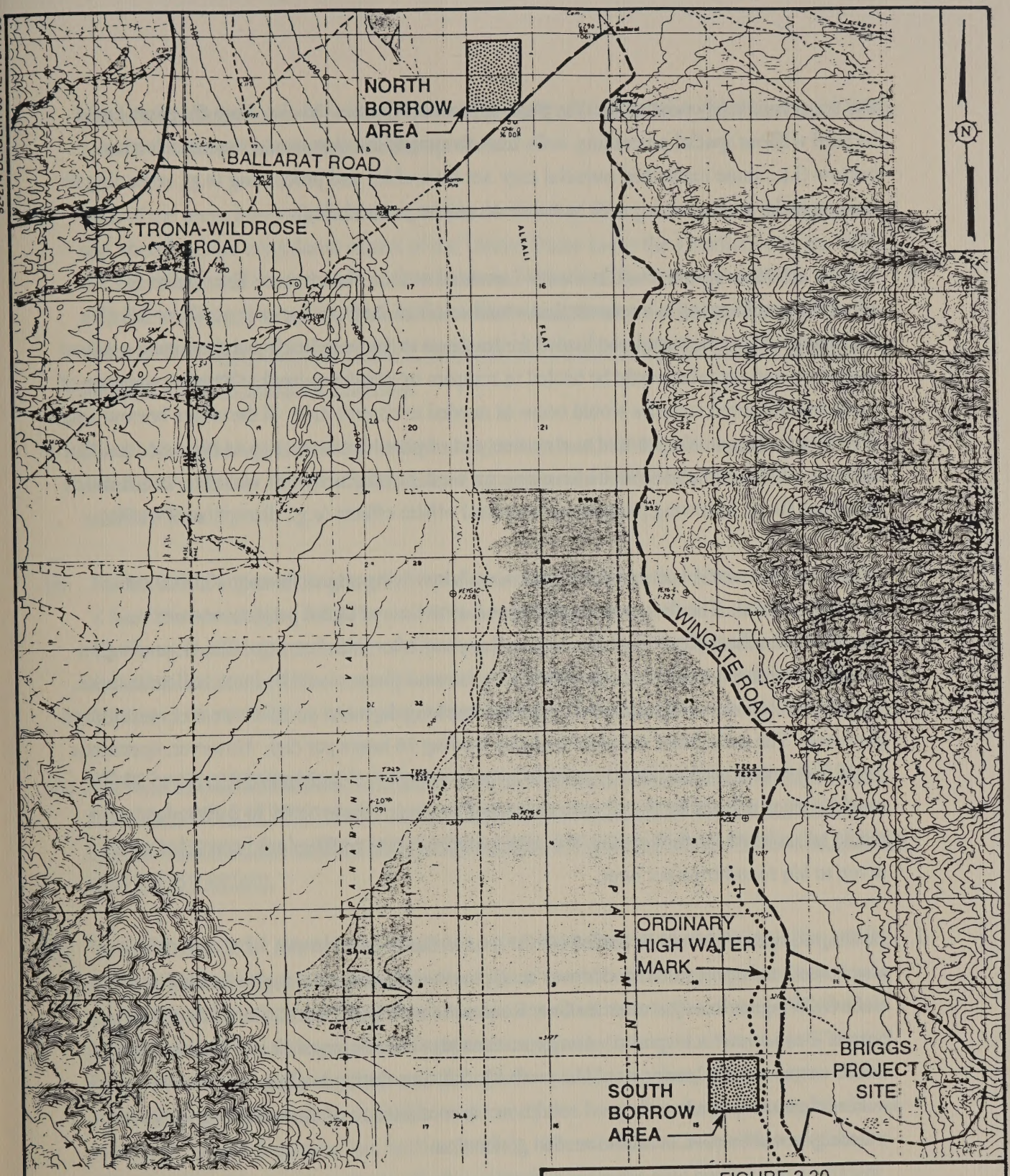
4. Access to offsite locations where clay borrow may occur for liner construction is discussed in Section 2.2.2.5.6.

2.2.2.5.6 Clay Borrow for Liner Construction

1. Construction of the composite liner system for the leach pad discussed in Section 2.2.2.3.1 would require a substantial quantity of clay with suitable properties for liner construction. The primary properties of importance are that the clay material, either naturally or through a reasonable amount of processing: (1) is relatively uniform and easily handled to facilitate good liner installation quality control; (2) can be compacted to achieve the specified minimum permeability of $1x10^{-6}$ cm/sec; and (3) contains few or no sharp rock particles that could potentially damage the FMLs. Smaller quantities of clay would also be required for the prepared liner subgrade for the process water ponds and the solution piping ditch. However, for these uses, soil physical parameters are less constraining (e.g., compacted permeability is not as critical) because these liners will be constructed with double FMLs.

2. An estimate 300,000 cubic yards of clay would be required for construction of facilities as planned. A portion of this requirement may be satisfied using material excavated from fault zones within the mine pit where the rock has been naturally altered to clay. It is expected, however, that the majority of the material will need to be obtained from an additional source. Three potential source areas have been identified; an onsite location shown in Figure 2.3 and two offsite locations shown in Figure 2.20. This document addresses the environmental impacts that could occur in the event that any one of these three locations are utilized. ~~However, the use of only one site would occur.~~

3. With regard to the quality and quantity of material available, the north borrow area and the south borrow area are equivalent; and superior to the onsite location. The north and south borrow areas are on the playa surface with similar physical settings. The clay is suitable for the intended use. The south borrow area would be the option preferred by the project proponent, if Congress acts to pass the DPA in a form that releases this location from WSA status as currently proposed (the south borrow area is located in the Slate Range WSA). The north borrow area is outside the WSA and would be available for use regardless of pending congressional actions. However, it is relatively far from the site and, therefore, less desirable. The north borrow area would be used if the south borrow area is not available (because of continuing WSA status) and the onsite location is determined to have insufficient quality or quantity of material. The onsite location is on the lower reaches of the alluvial fan, with soils



0 5,000 10,000 FEET
SCALE

REFERENCE:
7.5 MINUTE TOPOGRAPHIC MAPS OF BALLARAT, MANLY FALL, SLATE RANGE CROSSING, AND MATURANGO PEAK SE, CALIFORNIA, DATED 1988, 1984, 1982 AND 1982 RESPECTIVELY.

FIGURE 2.20

POTENTIAL OFFSITE
BORROW LOCATIONS

BRIGGS PROJECT

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that are considerably coarser than the playa deposits. Whereas the clay from the playa could be used without special processing, soils from the onsite location would require selective borrow (i.e., some excavated material may not be usable) and processing (e.g., screening to remove rocks and/or mixing with bentonite to reduce permeability).

4. Borrow activities would result in about 47 acres of surface disturbance. Excavation or regrading would occur in a manner that would result in shallow slopes (e.g., about 5H:1V). Borrow would be excavated and loaded for transport to the heap leach pad area using standard equipment and material would be hauled in scrapers or end-dump trucks. Routine watering of roads and disturbed surfaces would occur as needed to control dust. If the onsite borrow area is used, activities would proceed as a routine part of phased construction as discussed in other sections. If one of the two offsite locations are used, borrow activities would be structured as described in the following paragraphs to control offsite effects (e.g., disruption of traffic).

5. Offsite borrow would occur in three phases, each involving approximately 100,000 cubic yards of material. The first phase would occur at the time of initial project construction activities. The final phase may occur up to five years after initial construction, depending on the details of pad construction scheduling. The second phase would be intermediate to these. Each borrow phase would take about 50 to 60 working days and could occur up to seven days per week. The anticipated schedule includes hauling 16 hours per day. However, operations could occur during some periods up to 24 hours per day. It is anticipated that 20- to 30-ton capacity truck and trailer rigs or scrapers would be used. About 5,300 to 8,000 round trips would be required for each phase. It is anticipated that haul traffic would consist of about seven to ten round trips per hour.

6. Hauling equipment would be loaded off the road at the excavation site. If the north borrow area is used, transport would occur over an approximately one-mile segment of Ballarat Road and over Wingate Road between Ballarat Road and the Briggs Project site. If the south borrow area is used, transport over an approximately 0.5-mile segment of Wingate Road would occur. A road grader would be available full time during hauling operations and the road surface would be kept in good condition. A combination of dust palliatives and road watering would be used to minimize dust generation.

7. Signs would be posted to alert other road users of haul traffic and a speed limit of 25 miles per hour (mph) would be established for the hauling vehicles. In addition, if the south borrow

area is used, flaggers would be stationed on Wingate Road immediately north and south of the construction travel zone during hauling operations.

8. Both of the playa borrow locations are within the ordinary high water mark of the playa and, therefore, are considered waters of the United States under the jurisdiction of the COE. A Clean Water Act Section 404 permit would need to be obtained from the COE for disturbance of these areas. Canyon has submitted an application for this permit and it is under review. State 401 water quality certification, or waiver thereof, would be required pursuant to 33 CFR Section 330.4(c).

9. The BLM would regulate offsite borrow activities under 43 CFR 3600 regulations for sale of mineral materials. Canyon has submitted an application for the sale of minerals and it is under review.

10. For borrow at either of the playa locations, excavation would be limited to a depth of about 4 feet. Borrow activity would occur when the natural playa surface in the vicinity is dry. However, shallow ground water could be encountered. If the borrow excavation encounters saturated conditions, the excavated material would be temporarily stockpiled or windrowed adjacent to the excavation to remove excess water prior to loading the material for transport.

11. Offsite borrow activities would also be subject to the Mining Reclamation Plan and SMARA. After each period of borrow activity, an approximately one-foot-high clay berm would be constructed around the borrow excavation to prevent the excavation from draining the adjacent natural playa surface.

12. Both of the potential playa borrow locations occur where there is no vegetation. The north borrow area is contiguous with Ballarat Road; there would be no access road construction required if this area is used. If the south borrow area is used, an approximately 1,000-foot long access road would be required to reach the unvegetated borrow location from Wingate Road. This access road would traverse through the sparsely vegetated playa margin. Plant cover in the desert sink scrub vegetation community that comprises the playa margin has been estimated at about 6 percent (see Section 3.4.2.3). The access road would be routed to minimize disturbance to vegetation. Surface disturbance for the road could be up to 20 feet wide. Turnouts may be provided to facilitate passage of vehicles traveling in opposite directions. The existing ground surface at the location where the access is proposed is relatively flat, except for a hummocky configuration with relief of about 1 to 2 feet.

Construction of the road would include grading the existing surface into a smooth path and compacting the surface soils. If the soils prove not to support haul equipment, geotextile would be laid down over the soil and covered with a 1- to 3-foot thick layer of gravel to spread the load weight over the soil surface. Most of the access road to the south borrow area would be above the ordinary high water mark of the playa. About 200 feet of the road would be below the ordinary high water mark and, therefore, within COE jurisdiction. A short segment of the road (i.e., less than 100 feet) adjacent to the ordinary high water mark would traverse a thin band within the vegetated playa margin that the COE has delineated as wetlands also subject to their jurisdiction (wetlands are further discussed in Section 3.4.2.4).

12. Because of the surficial nature of potential excavation activities at the playa, it is not expected that important paleontological resources could be encountered. However, if fossils are discovered during excavation, work in the vicinity would cease and BLM would be notified.

2.2.2.6 Site Security and Safety

2.2.2.6.1 Security

1. Security measures would be implemented to protect mining and operations personnel and the general public. These measures would incorporate physical barriers, such as fencing and berms, with appropriate signage, as well as providing controlled access at the site entrance.

2. Fencing would be used to control access to potentially hazardous areas. Most facilities would be surrounded with barbed wire fencing installed to BLM specifications, restricting access to designated points. Chain link fencing with three strands of barbed wire at the top would be used to preclude access by unauthorized persons to the process water ponds and process area. An electrified fence would be installed around the heap leach pad to restrict access by wildlife. Other physical barriers such as earthen berms would be employed to limit vehicle access where necessary. Warning signs would be posted at regular intervals around facilities and at potential access points. Road signs and maximum speed limits would be posted along the access road. Canyon would not control or limit public access on Wingate Road.

3. Project security would be provided by site personnel with controls at the entry gate and vehicles to monitor the entire site. Safety for the general public would be provided by the physical barriers and project security. Large mobile mining equipment such as haul trucks

would not use roads accessible to the public unless preceded by a pilot car, flaggers, or other appropriate safety measures.

2.2.2.6.2 Worker Health and Safety

1. Although a characterization of workers' health and safety is not required for the EIS/EIR process, MSHA procedures are included to present a complete description of the Proposed Action.

2. Project operations would be conducted in accordance with MSHA requirements and guidelines. In accordance with these guidelines, employees would receive regular first aid and safety training for their specific tasks (i.e., operating equipment). Personnel in the processing area would receive training in handling reagents and would be familiar with a plan for containment and cleanup of potential spills. An EMT vehicle would be available onsite to transport personnel to an appropriate medical facility in the event of an injury.

2.2.2.6.3 Fire Protection

1. Canyon would provide fire prevention and fire suppression equipment at the Briggs Project site in accordance with state and local fire codes. Fire extinguishers would be provided in site buildings and site vehicles.

2.2.2.7 Environmental Monitoring and Protection

1. Extensive measures have been incorporated into the design and operations plans for the Briggs Project to provide for environmental protection. Monitoring would occur throughout construction, operations, and reclamation to assure that these measures achieve the intended effectiveness. Performance evaluation would occur on a routine basis to assure compliance with regulatory standards and to serve as an early warning system in the event of problems. An onsite employee would be assigned to coordinate the monitoring program. If monitoring indicates that unanticipated environmental impacts are occurring, operations would be adjusted accordingly.

2. An overview of environmental protection measures and monitoring that are planned is provided in this section. It is anticipated that additional requirements may be issued and some of the monitoring systems, schedules, or parameters described herein may be subject to

modification in conjunction with final project permitting. This environmental protection and monitoring overview is organized as follows:

- Section 2.2.2.7.1 - Water Quality Protection and Monitoring
- Section 2.2.2.7.2 - Water Quantity Conservation and Monitoring
- Section 2.2.2.7.3 - Air Quality Protection and Monitoring
- Section 2.2.2.7.4 - Wildlife Protection and Impact Monitoring
- Section 2.2.2.7.5 - Visual Resource Preservation and Impact Monitoring
- Section 2.2.2.7.6 - Reclamation Progress Monitoring

The Mitigation Monitoring Plan discussed in Chapter 4.0 would also provide additional follow-up monitoring to assure that the specified mitigation measures are adequately implemented and effective.

3. In order to provide assurance that monitoring discussed in this section and other appropriate environmental monitoring is fully implemented, BLM would require Canyon to develop a detailed environmental quality assurance plan for submittal to BLM, prior to issuance of notice to proceed with the project. BLM will require this plan to address, at a minimum, the following:

   - Measures for monitoring compliance with all permit conditions and stipulations imposed as part of agency approvals.
   - Persons responsible for maintaining compliance.
   - Frequency of inspections to monitor for compliance, and persons or parties (e.g., agencies) performing monitoring inspections.
   - Frequency for reporting the compliance status to BLM.

2.2.2.7.1 Water Quality Protection and Monitoring

1. The heap leach processing circuit would be designed as a closed system with no discharge. The potential for leakage from containment facilities would be minimized through stringent design standards and construction quality control; to both contain the process solution for gold recovery, and to limit the potential for soil or ground water contamination. Reagent and petroleum storage facilities would be designed with secondary containment to minimize the potential for spills or leaks to the environment. A Spill Prevention Control and Countermeasures (SPCC) Plan (further discussed in Section 2.2.2.8) would be developed to assure implementation of a proactive spill prevention program. The site would be designed, operated, and reclaimed using good practices for control of surface water run-on and runoff and to provide for ground stabilization.

2. As further discussed in Section 3.3.2, background water monitoring was initiated in February 1993, to provide data for comparison of water chemistry. Ground water ranges

from about 70 to 300 feet deep beneath the heap leach pad area (depending upon the ground surface elevation) and has a high total dissolved solids (TDS) concentration.

3. A summary of planned water quality monitoring is provided in Table 2.8. Key monitoring locations are shown in Figure 2.21. Planned measures include the following:
   - Surface water monitoring.
   - Ground water monitoring.
   - Monitoring of the vadose (unsaturated) zone beneath and adjacent to solution containment systems.
   - Monitoring of operational controls for protection of water resources.

4. Background surface water quality monitoring will take place at SW-1, a monitoring point established at Redlands Spring. Canyon has been monitoring this point since January 1993 and is establishing the background water quality at this point. This is the only known perennial surface water point within miles of the Briggs Project. It is not anticipated that the Briggs Project will affect this point as it is upgradient, and in a separate hydrologic regime than ground water beneath the processing area (see Section 3.3).

5. Stormwater flows would also be monitored. On occasions when there is enough rainfall to result in substantive surface flow, rate of flow in the site diversion channels would be estimated and general quality would be monitored at onsite and downgradient locations. Specific parameters would be designated by the RWQCB in the NPDES permit required by federal regulation. It is anticipated that the monitoring parameters may include pH, total suspended solids (TSS), specific conductance, and oil and grease. If enough rainfall occurs to cause ponding in the mine pit, it would be sampled and the quality analyzed.

6. One upgradient and as many as five downgradient ground water wells located in the processing area would be monitored for water elevation, temperature, pH, electrical conductivity, TDS and cyanide. Data would be used to: (1) confirm that processing solutions do not escape to ground water; and (2) evaluate ground water drawdown due to pumping to see that unexpected drawdown does not occur. The site water production wells (PW-1 and PW-2) would also be monitored to assure that anticipated drawdown is not being exceeded and to comply with requirements of CCR Title 22, Chapter 15 for potable water system quality monitoring. Compliance with CCR Title 22, Chapter 15 would be required because these wells would feed the reverse osmosis unit used to produce potable water.

TABLE 2.8

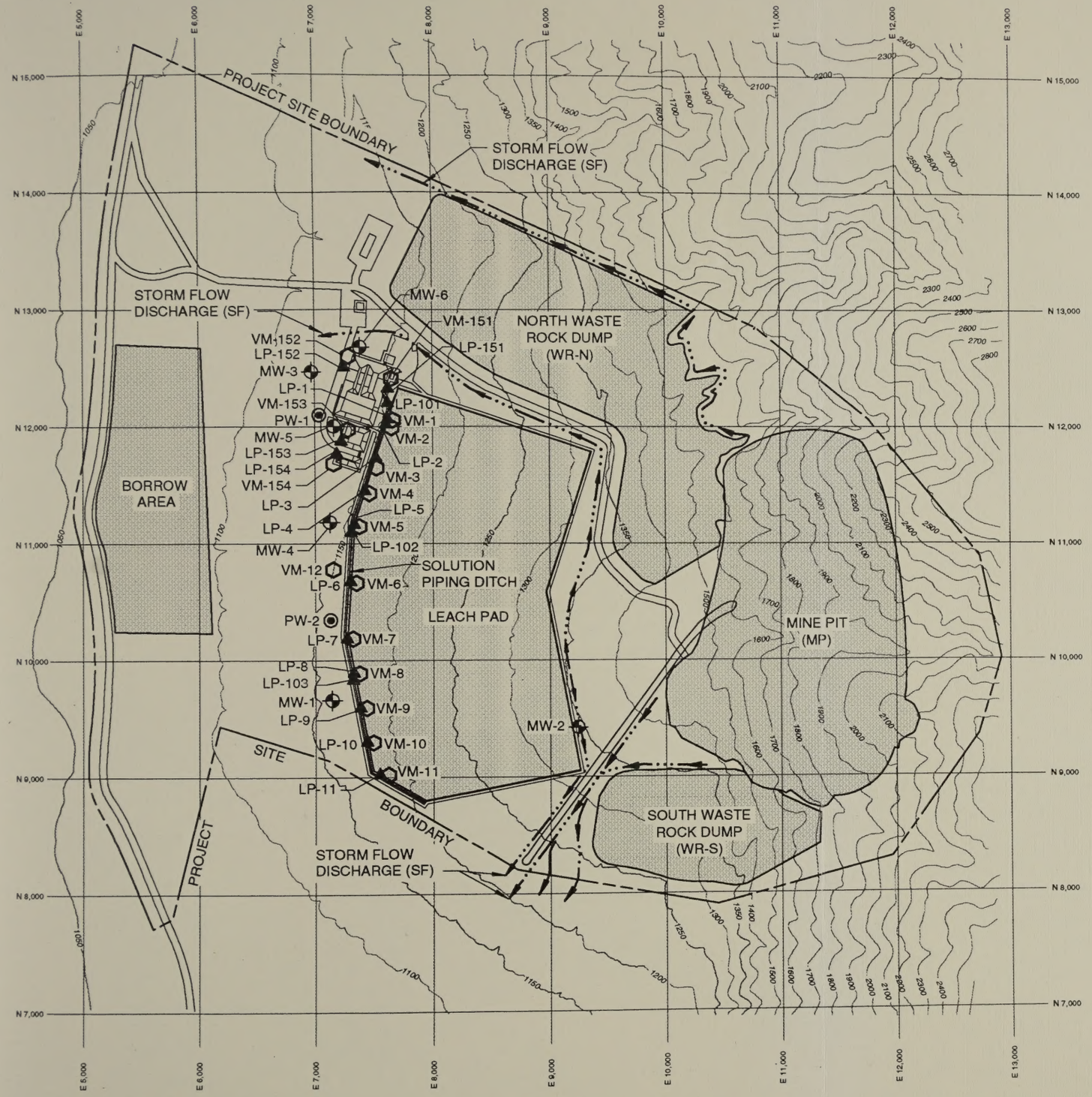
PRELIMINARY WATER QUALITY AND QUANTITY MONITORING PLAN SUMMARY

FEATURE MONITORED	FIGURE 2.21 DESIGNATION	LOCATION	PARAMETERS MONITORED[1]	FREQUENCY
Surface Water				
• Redlands Spring (background)	--	1/2 mile east of site	Quantity of flow, temperature, pH, EC, CN	Quarterly
• Stormflow	SF	Onsite channels and downgradient	Flow, pH, TDS, EC, O&G, or as required by NPDES stormwater permit	All substantive surface flows
• Playa fringe wetlands	--	West and north of site	Depth to saturation	Quarterly
• Precipitation ponded in mine pit	MP	Mine pit bottom	pH, EC, metals	When precipitation results in substantive ponding
Ground Water				
• Upgradient (background) well	MW-2	East of leach pad	Water elevation, temperature, pH, EC, CN, TDS	Quarterly
• Downgradient wells	MW-1 and MW-3 through MW-6	West of leach pad and pond area	Water elevation, temperature, pH, EC, CN, TDS	Quarterly
• Water production wells	PW-1, PW-2	West of leach pad	Water elevation, organic and inorganic constituents as required by CCR Title 22, Chapter 15	Quarterly water level measurements, organic and inorganic constituents as required by CCR Title 22, Chapter 15
• In-line flow meters	--	Water production wells/water line	Water use rate and volume	Continuous, recorded monthly
Vadose Zone				
• Vadose monitors	VM-1 through VM-12 and VM-151 through VM-154	Leach pad subgrade, west of leach pad, and pond area	Moisture, pH, CN	Monthly
Operational Controls				
• Leach pad drainage pipes	LP-1 through LP-11	Western pad perimeter	Flow, pH, CN	Daily
• Process water ponds LCRS	LP-151 through LP-154	Pond area	Seepage throughput	Daily
• Piping ditch LCRS	LP-101, LP-102, LP-103	Western pad perimeter	Seepage throughput	Daily
• Ore and waste rock chemistry	WR-N, WR-S	Waste rock piles	NP, AP, metals	Semiannually
• Stormwater control channels	--	Leach pad and waste rock areas	Excessive erosion or siltation	After all substantive surface flows and at least annually
• Roads and other graded areas and general vicinity	--	Site and adjacent area	Excessive erosion or siltation	After all substantive surface flows
• Secondary containment facilities	--	Reagent and oil storage areas	Integrity of lined areas and secondary containment curbs/dikes	Daily
• Quality of runoff from the equipment washdown pad	--	Mine maintenance shop area	pH, TDS, EC, O&G, CN	(2)
• Potable water quality	--	Reverse osmosis plant	Bacteriological, organic and inorganic constituents as required by CCR Title 22, Chapter 15	As required by CCR Title 22, Chapter 15

(1) O&G = Oil and Grease
EC = Electrical Conductivity
CN = Cyanide
NP = Neutralization Potential
AP = Acid Potential

(2) Runoff would be contained and could be evaporated or recycled to the ore processing circuit. Monitoring of water quality would only be required if this water is intended for use to control dust.

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LEGEND

MW-1	⌖	DEDICATED MONITORING WELL
VM-1	⬡	VADOSE ZONE MONITORING POINT
LP-1	▲	OPERATIONAL MONITORING POINT
PW-1	◉	PRODUCTION WELL

NOTE:

WATER MONITORING LOCATIONS ARE SUBJECT TO CHANGE PENDING APPROVAL OF A WASTE DISCHARGE ORDER AND STORMWATER NPDES PERMIT BY THE RWQCB.

0 1,000 2,000 FEET
SCALE

REFERENCE: WESTEC, INC., 1993c.

FIGURE 2.21

SELECTED PRELIMINARY WATER MONITORING LOCATIONS

BRIGGS PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

7. Vadose (unsaturated) zone monitoring would occur beneath and downgradient of the heap leach pad, and beneath the process water ponds, to provide for detection of a potential leak before ground water is affected. The preliminary vadose zone monitoring plan is to provide subsurface lysimeters. However, vadose zone monitoring technology is a progressing science and other more preferable methods could be used, subject to RWQCB approval. For the lysimeter configuration, moisture would be drawn from the soil pores and analyzed for pH and cyanide.

8. Operational control monitoring for ground water protection would include:
   - Measuring flows at the leach pad drainage pipes to confirm adequate drainage of processing solution over the top of the leach pad liner, so that hydrostatic pressure over the liner is controlled.
   - Monitoring seepage into the process water ponds and piping ditch LCRS to confirm that liners are functioning adequately, and returning recovered seepage to the processing circuit.
   - Analyzing representative samples of ore and waste rock excavated during operations to confirm that the rock is not prone to producing acid drainage conditions.
   - Inspecting stormwater channels, graded areas, and roads on the site and surrounding areas after precipitation events resulting in substantial surface flows to observe for signs of excessive erosion or siltation.
   - Observing secondary containment facilities at fuel and reagent storage areas to assure their integrity.

   Operational water quality monitoring would also include routine analysis of potable water from the reverse osmosis unit as required by CCR Title 22, Chapter 15.

2.2.2.7.2 Water Quantity Conservation and Monitoring

1. The primary measures that would occur to conserve water would include:
   - Using surfactants, chemical binders, or other dust palliatives in combination with water spraying to reduce dust.
   - Designing and operating the ore processing circuit to reduce evaporation, including using drip irrigation to apply solution to the top of the heap leach pad and providing floating covers on the process water ponds.
   - Recycling water to the maximum extent practical.

2. Water quantity impacts of the project would be monitored by tracking water consumption and drawdown of the ground water surface near the production water wells. Water use would be measured on a continuous basis using in-line flow meters on the production water line. The meters would provide instantaneous flow measurements and cumulative flow totalizers, both

of which would be recorded periodically. Drawdown would be monitored by periodic sounding and recording of water levels in each monitoring and production well. On an annual basis, measured drawdown would be evaluated for consistency with the projected drawdown discussed in Section 4.3.1.1. An annual report would be submitted to BLM projecting the maximum drawdown expected to occur throughout the project life based on results of monitoring. If water level monitoring indicates that the projected drawdown discussed in Section 4.3.1.1 may be exceeded, BLM and the County would require additional analyses to characterize drawdown impacts. If environmental impacts could materially exceed those analyzed in this document, a new CEQA/NEPA analysis may be necessary.

3. The COE has determined that a narrow band of jurisdictional wetlands occurs adjacent to the ordinary high water mark of the playa in the site vicinity. For the most part, this band is less than 50 feet wide and vegetation is indistinguishable from the surrounding area. The exception is two small locales, each encompassing less than 2 acres, with one located west of the site and one located about one mile north of the site. At these locales, minor differences in vegetation occur (see Section 3.4 for further discussion). There is normally no surface water at the wetlands, but the soil is saturated near the surface. At the two locales where vegetation is distinguishable from the surrounding area, the depth to the saturated zone would be monitored on a quarterly basis to determine if drawdown from water production pumping substantively impacts these areas. If, for two consecutive monitoring periods, the measured depth to saturation at these locales drops more than 2 feet as compared to the shallowest depth to saturation measured during baseline studies, a vegetation stress monitoring program would be implemented. Stress monitoring would be conducted by a qualified biologist twice each year during the growing season. If it is determined that vegetation is being adversely affected by ground water drawdown, mitigation would be employed as required by BLM. Potential mitigation methods are discussed in Section 4.4.1.2.1.

4. Flow at Redlands Spring would also be monitored as discussed in Section 2.2.2.7.1.

2.2.2.7.3 Air Quality Protection and Monitoring

1. Extensive measures are incorporated into the project design and operation to minimize impacts to air quality. Key measures include:
   - Control of dust from site roads, disturbed surfaces and earthmoving by spraying with water and other dust palliatives (e.g., surfactants, chemical binders).

- Control of dust from ore crushing and conveying using water sprays and/or shrouded transfer points and baghouses.
- Control of NO_x from the diesel-fired generators using the Best Available Control Technology (BACT), which has been determined to be Selective Catalytic Reduction (SCR) and Timing Retard, as further discussed in Section 4.6.
- Control of emissions from other stationary sources utilizing appropriate emissions reducing equipment.
- Minimization of fuel burning emissions through routine maintenance of equipment, optimization of activities and minimization of haul distances.

The APCD has the authority to ensure that ambient air quality in the vicinity of the project site is maintained in accordance with federal and state mandated ambient air quality standards. It is anticipated that the APCD may require meteorological and air quality data to be collected for the life of the project as a condition of issuing permits to construct and operate the Proposed Action. The purpose would be to verify that impacts do not exceed those predicted by modeling and to document compliance of mining activities with air quality permit restrictions. Anticipated air quality monitoring is summarized in Table 2.9.

2. It is anticipated that a meteorological monitoring station would be installed to collect wind speed, wind direction, temperature and precipitation data. Air quality monitoring would include PM_{10} and monitoring for hydrogen cyanide (HCN) gas. PM_{10} monitoring would include provisions to decipher onsite particulate contributions from offsite particulate contributions (e.g., by providing upwind and downwind monitoring stations). Monitoring would be implemented in accordance with applicable federal and state regulations and air quality permit conditions. Recordkeeping of fuel consumed, tonnages of rock moved and crusher system throughput would also be kept.

2.2.2.7.4 Wildlife Protection and Impact Monitoring

1. Measures that would be incorporated into the project design and operation to protect wildlife include:
   - An electrified fence surrounding heap leach pad to discourage entry of large mammals. The fence would be designed to minimize the potential for injury to wildlife.
   - Buried solution distribution lines on the top of the heap leach pad so surface ponding which could attract birds and animals does not occur.
   - Floating covers and chain link fencing for solution ponds to prevent access by birds and other wildlife.

TABLE 2.9

PRELIMINARY AIR QUALITY MONITORING PLAN SUMMARY

FEATURE MONITORED	LOCATION	PARAMETERS RECORDED	FREQUENCY
Meteorology • Wind speed • Wind direction • Temperature • Precipitation	• Northwest corner of the site or as otherwise designated by APCD	• Peak and time-averaged speed • Direction and variability • Peak, low and daily average • Rainfall	• Instantaneous
Airborne Particulates • PM_{10} high volume samplers	• Northwest and southwest corners of the site or as otherwise designated by APCD	• Time-weighted concentration by volume	• Six-day CARB schedule
HCN Gas • Draeger tubes or other hand-held device	• Leach pad, process water ponds, gold processing plant, and downwind locations	• Instantaneous HCN concentration by volume	• Weekly
Operational Controls • Fuel consumption • Process circuit throughput • pH of cyanide solutions • Emission control equipment operating parameters	• Fuel inventory logs • Crusher circuit belt scales • Pregnant, barren and carbon stripping solutions • Doré furnace gas scrubber • Other equipment, as required by APCD and applicable rules and regulations	• Fuel consumed • Ore crushing tonnage • pH • Gas scrubber pressure and water flow rate. • Parameters required by APCD and applicable rules and regulations.	• Monthly • Instantaneous, recorded daily • Daily • Continuous • As required

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- Solution transport using enclosed pipes within lined ditches to prevent open solution from attracting wildlife. Drain areas with exposed solution would be netted.
- Avoiding disturbance of Redlands Spring, where bighorn sheep and other wildlife are known to visit.
- Examination of shafts and adits by a qualified bat biologist prior to earthmoving activities, in order to estimate the likelihood of occupation by bats or other species. Shafts and adits with no evidence of wildlife occupation would be immediately barricaded using materials and configurations acceptable to BLM and DFG to preclude wildlife access.
- Project waste would be properly managed and the site monitored to control garbage that could attract wildlife.
- A wildlife education program for employees would be implemented to acquaint personnel with procedures to be followed, should wildlife be encountered. Employees would not be allowed to bring dogs or other domestic animals to the site. Employees would not be allowed to bring firearms to the site except for security personnel.

2. BLM would be notified within 24 hours of the discovery of any wildlife ~~fauna~~ mortality. A monthly wildlife mortality report would be submitted to the BLM. The report would identify all known animal mortalities onsite by number, species (if possible), and probable cause of death. Annual reports would be submitted to BLM summarizing monthly reports.

3. Canyon has funded an inventory program to locate possible alternate maternity roost sites for a colony of Townsend's big-eared bats (see Section 4.5) that would be displaced from the Briggs Project area. A program to monitor the displaced bats would be developed in cooperation with BLM and DFG ~~other interested wildlife management agencies~~. Reports would be generated as required by the program.

4. A time lapse video camera has been installed on the hillside above Redlands Spring. ~~The program was designed~~ to provide information on bighorn sheep use of the spring. ~~, but actually provides information on all animals large enough to be seen by the camera.~~ Tapes from the camera are viewed by wildlife biologists who record date, time, number of animals, species, and any other information that can be gained from the tapes. Reports on this wildlife monitoring would be assembled on a monthly basis and submitted to BLM. Copies of the tapes would also be provided to BLM on a monthly basis. An annual report would be submitted to BLM summarizing monthly reports. Canyon would operate the camera until BLM has determined that Canyon has fulfilled their reclamation and environmental management obligations, or until it is determined that no more information can be gained by

continued monitoring, whichever comes first. Flow at Redlands Spring would also be monitored for the duration of the project and the postclosure monitoring period, although it is not expected that the spring would be affected by Briggs Project activities.

5. In addition, Canyon would participate in a program to monitor the presence/absence and broad movement patterns of bighorn sheep in the project vicinity. This monitoring would occur as a combined effort of BLM, DVNM, DFG, and industry.

2.2.2.7.5 Visual Resource Preservation and Impact Monitoring

1. Measures that would be implemented to reduce visual impacts of the project include the following:
   - Controlling dust generation as discussed in Section 2.2.2.7.3.
   - Buildings and structures would be painted with low-reflective (i.e., flat finish) earth tone colors to blend with the surrounding landscape.
   - Outdoor lighting for the mine pit and other areas of nighttime activity would be shielded and directed downward to reduce fugitive light, and light poles would be as short as practical. Low pressure sodium bulbs would be used for outdoor lighting where practical.
   - Removing equipment, buildings, supplies and debris at the completion of the project and reclaiming the site to reduce contrast with the natural landscape in conformance with the reclamation plan discussed in Section 2.2.3.
   - The highwall portion of the mine pit that is visible from offsite areas would be stained where the color of freshly exposed rock contrasts with natural rock color variations.

2. As the pit highwall is excavated, the contrast of freshly exposed rock colors to natural rock colors in the vicinity would be periodically observed and measured using a standardized color contrast rating system. Portions of the pit wall that contrast sharply with natural rock colors would be treated with rock stain.

3. Visual contrast of the overall site would be monitored annually by observing the site from key locations, including Wingate Road adjacent to the site area and Trona-Wildrose Road. The overall site would be compared to photosimulations of the project presented in Chapter 4.0. Night visibility of the site would also be monitored through annual observations. Observations would be recorded by photographs from the key observation points.

4. Records of the site visibility and contrast evaluations, with accompanying photographs, would be submitted to BLM and the County as part of an annual report.

2.2.2.7.6 Reclamation Progress Monitoring

1. The project reclamation plan is discussed in Section 2.2.3. Reclamation activities would occur during project operations and the time of project decommissioning. Reclamation activities that would occur concurrent with operations include: (1) interim stabilization of disturbed surfaces that would not be subject to additional disturbance for an extended period of time (i.e., three years or more); (2) test plots to evaluate the effectiveness of various revegetation techniques; and (3) final reclamation measures such as regrading, growth media placement, surface stabilization and reseeding in areas where development may be completed prior to site decommissioning, for example, portions of the waste rock piles.

2. During the life of the project, site areas would be routinely observed through the normal course of operations. Reclamation progress would be formally recorded on an annual basis. At a minimum, the following records would be maintained:
   - Acreage disturbed.
   - Acreage over which interim and final reclamation measures have occurred, and a description of those measures.
   - Estimated growth media salvaged, stockpiled, and used, and measures implemented or planned to maximize the potential to maintain soil potency.
   - Progress and evaluation of revegetation test plots, including planting and husbandry techniques, vegetation growth and establishment, statistical evaluation of density and cover percentage, and photographs.
   - Weed species observed in disturbed areas, if any, and measures used to eradicate weeds.

   This information would be provided to BLM and the County in an annual report.

3. Subsequent to project decommissioning and implementation of final reclamation measures, a reclamation report would be submitted to BLM and the County detailing final reclamation efforts. This report would document measures taken including: removal of buildings, structures, equipment and debris; procedures for abandonment of wells; regrading efforts and final site topography; ground stabilization measures; growth media placement and thickness; reseeding; removal or maintenance of fencing; and other activities. Conformance with the approved reclamation plan would be evaluated and discussed in this report. Ground

photographs of representative areas of the site would be provided, as well as an aerial photograph and topographic map of the overall site.

4. Following final reclamation, the site would be inspected on a quarterly basis for at least three years and then on a schedule approved by BLM and the County, but at least annually, until reclamation efforts are deemed complete. Post-mining inspections would focus on the following:

   - Adequacy of ground stabilization measures and observation for excessive erosion potential.
   - Progress of revegetation.
   - Maintenance of fencing that may be left in place temporarily to enhance the potential for vegetation establishment.
   - Sampling any water that may occur in the bottom of the pit due to occasional rains, and analyzing the quality of such water.
   - Control of noxious weeds.

   Results of these inspections and any corrective or follow-up actions taken would be provided to BLM and the County on an annual basis.

2.2.2.8 Spill Prevention

1. ~~The~~ An SPCC Plan would be compiled for fuel storage and an Emergency Response Plan for reagents, addressing ~~reagent and fuel storage~~ measures that would be implemented to prevent spills, and procedures for notification and cleanup in the event of a spill. The SPCC and Emergency Response Plans may be either separate or combined. The ~~plan~~ plans would address the following topics, at a minimum:

   - Reagents
     - Types of reagents used.
     - Operation, maintenance inspections and safety procedures.
     - Emergency planning.
     - Local agency planning.
     - Hazardous material incident reporting.
     - Cleanup and detoxification.
     - Recordkeeping and reporting.
     - Plan implementation and amendment.
   - Oil Storage
     - Types of oil used.
     - Spill containment facilities.
     - Operation, maintenance inspections and safety procedures.
     - Emergency planning.
     - Recordkeeping and reporting.

2. The specific objectives of the ~~SPCC Plan~~ plans would be to:
   - Formalize a well-defined materials management program to reduce the potential for accidental spills of materials that could pose a threat to human health or wildlife or degrade the environment.
   - Provide operating staff with the necessary information to properly respond to a hazardous material or petroleum spill.
   - Clearly define responsibilities for spill notification and control of spills.
   - Provide a defined program of preparedness for response and cleanup in a manner that minimizes or eliminates environmental impacts.

3. An overview of the program that would be defined in the ~~SPCC Plan~~ plans is provided in this section, organized as follows:
   - Section 2.2.2.8.1 - Spill Prevention Measures
   - Section 2.2.2.8.2 - Spill Preparedness Measures
   - Section 2.2.2.8.3 - Spill Response
   - Section 2.2.2.8.4 - Offsite Occurrences

2.2.2.8.1 Spill Prevention Measures

1. Design and operation of the project would include safeguards to minimize the potential for spills of process solution, reagents and petroleum products. The heap leach pad, piping ditch and process water ponds would be designed to contain solution with a minimum of 2 feet of freeboard for 100-year, 24-hour storm conditions. Inspection of the processing area would occur during any precipitation event that results in substantial surface runoff to confirm containment systems integrity and performance.

2. The gold plant would be constructed on a reinforced concrete slab and sloped or curbed to contain drainage, which would be recycled to the heap leach circuit. Reagent storage and mix areas would also have a reinforced concrete slab and/or synthetic liners to provide secondary containment. Hazardous reagents would only be stored in designated areas, with appropriate precautions considering container size and material properties. Cyanide would be stored and handled only in areas where spill protection is provided. If liquid cyanide reagent is used, the truck-transfer area and storage tank would be designed with secondary containment for the largest possible spill. All cyanide solutions would be maintained at a pH of 10.0 or higher to minimize formation of HCN gas.

3. Tanks containing petroleum products or other hazardous material would have secondary containment for at least 110 percent of the largest ~~maximum~~ tank capacity. Unattended

pumping of hazardous materials would not be allowed. Petroleum pumping areas would be graded to provide drainage control so that a potential pumping-related spill (e.g., overpumping or hose rupture) would remain contained. The integrity of tanks, fittings and secondary containment would be monitored frequently.

4. Warehouse storage of drummed petroleum products would occur indoors or outdoors off the ground (e.g., on pallets). The area would be frequently observed (e.g., daily) and the integrity of containers would be monitored. Stock would be rotated to minimize the potential for old drums to be present.

5. Delivery trucks coming onto the site would be inspected for potential leakage upon arrival.

2.2.2.8.2 Spill Preparedness Measures

1. Canyon would develop the capability to handle an emergency spill prior to the startup of operations, thereby minimizing the threat of environmental contamination and injury to humans or wildlife after the introduction of potentially harmful material to the site.

2. An Emergency Response Team would be designated, comprised of about five mine supervisors and personnel who are specially trained in spill containment and neutralization procedures, and in first-aid treatment. All members of the Emergency Response Team would be well-trained and equipped with the knowledge and materials needed to carry out their duties. Team members would be issued copies of the SPCC ~~Plan~~ and Emergency Response Plans and would receive annual emergency response training, including review of the SPCC Plan.

3. Team members would be available by telephone on a 24-hour basis. In the event of a spill, the Emergency Response Team coordinator would be contacted immediately and he/she would be responsible for notifying other team members as needed.

4. The following emergency response materials and equipment would be maintained onsite for immediate use during a spill event:
   - First aid supplies.
   - Cyanide neutralizing agent.
   - A 50 foot x 50 foot impermeable plastic sheet and a heavy duty tarp.
   - Sampling equipment including: sample bottles, bags, labels, pens, and sampling apparatus (e.g., trowel, etc.).

- Full safety gear including:
  - National Institute for Occupational Safety and Health approved respirators for cyanide compounds and dust.
  - Waders (rubber boots).
  - Rubber and leather gloves.
  - Chemical resistant suits.
  - Face shields.
  - Hard hats/helmets.
  - Air sampler kit for HCN.
- Tool kit.
- Shovels, brooms and dust pans.
- Empty resealable containers (e.g., 30-gallon drums).
- Granular adsorbent.
- A copy of the SPCC ~~Plan~~ and Emergency Response Plans.
- Other safety materials as specified in the SPCC ~~Plan~~ and Emergency Response Plans.

Heavy equipment (e.g., loaders) would also be available for use, if needed.

5. Material safety data sheets would be kept onsite for all potentially hazardous materials. Processing area employees would receive training on hazardous materials that may occur in their areas of responsibility, including their use, spill prevention and appropriate actions in the event a leak or spill is observed. Refresher training would be provided annually.

6. Copies of an emergency contact phone list would be prominently posted near strategic telephone locations. First aid procedures for cyanide poisoning would also be prominently posted at several key locations.

2.2.2.8.3 Spill Response

1. The basic steps to be taken in any emergency spill situation would be:
   - Initial assessment of the spill scenario.
   - Protect the lives of people.
   - Render emergency first aid, if required.
   - Notify proper authorities.
   - Contain and neutralize the spill.
   - Conduct site cleanup and remove contaminated materials from site.
   - Document and report incident.
   - Monitor potentially affected resources.
   - Reassess spill prevention and response procedures.

2. Mine and processing area employees would be instructed to make a quick initial assessment of the source of any spill or leak observed while maintaining personal safety. First priority would be given to protection against injury or loss of human life, and then to any immediate responses to minimize effects to the environment that do not unduly delay notification of the Emergency

Response Team. Personnel would be instructed to perform the appropriate immediate actions and then notify a supervisor and/or Emergency Response Team member immediately.

3. Management and the Emergency Response Team would take prompt action as necessary to protect human health and eliminate the source of the spill, and contain and clean up the spill. Emergency equipment discussed in Section 2.2.2.8.2 would be used as required. Unnecessary personnel would be evacuated from the area if there is potential for unhealthful exposure. Specific containment, cleanup and safety measures for the various hazardous materials onsite and for various spill scenarios would be addressed in the SPCC ~~Plan~~ and Emergency Response Plans. Management personnel would be responsible for notification to appropriate agencies in accordance with applicable federal and state regulations, and additional requirements that may be imposed as permit conditions. Notifications would include immediate telephone contacts and follow-up written reports.

4. Cleanup methods could include dry cleanup of solid substances, detoxification and/or excavation of contaminated soil, and other appropriate measures. If possible, any spilled reagents would be salvaged. If soils are recovered containing spilled process solution or residual reagents from the processing circuit, they would be placed on the leach pad to recover any contained reagents or gold values.

2.2.2.8.4 Offsite Occurrences

1. Safe transport of materials to the site is the responsibility of the transporter, who must comply with state transportation regulations, including requirements for vehicle safety inspections, safe loading and containment practices, and driver qualification and training. Canyon would use due diligence in utilizing good professional practices to obtain supplies from reputable vendors.

2. If a hazardous material transportation incident (e.g., an accident or spill) were to occur on a public roadway in the site vicinity, Canyon would cooperate with local public services and agencies in being available to assist in emergency services. The mine manager would have the authority to dispense personnel and/or equipment if needed for public assistance.

2.2.3 RECLAMATION PLAN

2.2.3.1 Organization and Scope

1. This section discusses planned reclamation measures for the Briggs Project, which are part of the Proposed Action and considered in the assessment of potential environmental impacts in Chapter 4.0. Canyon will be required to submit and receive approval for a detailed reclamation plan to BLM and the County before project operations can be initiated. This section is not intended to provide the level of detail required for the formal reclamation plan, but discusses concepts and objectives of planned measures adequately to allow evaluation of potential residual impacts after reclamation is complete. These objectives are qualitative by nature. Once these objectives are agreed upon, a quantitative plan (design criteria) implementing the objectives will be developed and documented in the Final EIS/EIR and BLM's Record of Decision.

2. The reclamation plan for the Briggs Project includes grading, ground preparation, ~~and~~ seeding and live planting measures designed to provide for ~~some short-term~~ ground stabilization and some reestablishment of vegetation in the short term; and to enhance the potential for natural vegetation to occur over time. Species exotic to the area would not be used. Warm season plants are present on the site. The goal of revegetation efforts would be to establish, over the long term (i.e., decades), a native vegetation community similar to existing conditions. The Panamint Valley is one of the lowest rainfall areas in the arid southwest. Experience in reclamation of dry desert sites has shown that ground preparation to enhance natural revegetation over time is the most effective practical revegetation measure to achieve this long-term goal. ~~Vegetation in the area is naturally sparse and does not play a prominent role in surface stabilization.~~ Surface stabilization would be provided by grading and other measures ~~of~~ included in the reclamation plan.

3. The BLM and the County will hold Canyon responsible for implementation of best practical efforts for long- and short-term revegetation success. However, the evaluation of impacts in Chapter 4.0 is based on recognition that, because of the harsh climate and low rainfall, revegetation efforts would not be expected to result in reestablishment of vegetation with existing species density or diversity over the short term.

4. Discussion of the reclamation plan is organized as follows:
   - Section 2.2.3.2 - Reclamation Considerations, discusses federal and state reclamation requirements, the objectives and goals of the Briggs Project reclamation plan, post-mining land uses for which the reclamation plan is

designed, and site conditions that have been considered in the reclamation plan development.

- Section 2.2.3.3 - Concurrent Reclamation and Revegetation Test Plots, discusses reclamation and revegetation studies that would occur during operations.
- Section 2.2.3.4 - Reclamation Measures, discusses decommissioning of individual site facilities, regrading, growth media salvage, seedbed preparation and reseeding techniques, maintenance and monitoring of reclaimed areas, and criteria for determination of revegetation success.
- Section 2.2.3.5 - Public Safety, discusses reclamation measures specifically intended to provide for public safety consistent with post-mining land uses.
- Section 2.2.3.6 - Schedule, discusses the planned timeline for implementation of reclamation measures.
- Section 2.2.3.7 - Financial Assurance, discusses financial assurance that would be required from Canyon pursuant to SMARA and BLM requirements to guarantee that reclamation measures would be completed.

2.2.3.2 Reclamation Considerations

2.2.3.2.1 Regulatory Requirements

1. Reclamation is a regulatory requirement of the FLPMA and CFR (43 CFR 3809) administered by BLM, and SMARA administered by the County. The general purpose of reclamation is to provide the means whereby the project site may be productively used for extraction of its mineral resources, and then in accordance with SMARA "...reclaimed to a usable condition which is readily adaptable for alternative land uses."

Federal Regulations

1. Under federal mining laws, a person (or company) has a statutory right to go upon federal land for the purposes of mineral prospecting, exploration, development, extraction, and other uses reasonably incident thereto. However, "this statutory right carries with it the responsibility to include adequate and responsible measures to prevent unnecessary or undue degradation of the federal lands and to provide for reasonable reclamation" (43 CFR 3809.0-6). Reclamation is defined by 43 CFR regulations as follows:
   - "Reclamation means taking such reasonable measures as will prevent unnecessary or undue degradation of the federal lands, including reshaping land disturbed by operations to an appropriate contour and, where necessary, revegetating disturbed areas so as to provide a diverse vegetative cover."

   On federal lands administered by BLM, it is BLM's responsibility that mining operations are completed in conformance with these objectives and specific requirements.

2. According to 43 CFR reclamation shall include but not be limited to:
   - "Saving topsoil for final application after reshaping of disturbed areas have been completed.
   - Measures to control erosion, landslides, and water runoff.
   - Measures to isolate, remove, or control toxic materials.
   - Reshaping the area disturbed, application of the topsoil, and revegetation of disturbed areas, where reasonably practicable.
   - Rehabilitation of fisheries and wildlife habitat."

3. BLM implements federal reclamation regulations and policies pertaining to gold mining under the guidance of their Solid Minerals Reclamation Handbook (BLM Manual Handbook H-3042-1).

State Regulations

1. In California, SMARA requires preparation and approval of a reclamation plan as part of the overall permitting process for an open pit mine. SMARA defines reclamation as:
   - "Reclamation means the combined process of land treatment that minimizes water degradation, air pollution, damage to aquatic or wildlife habitat, flooding, erosion, and other adverse effects for surface mining operation, including adverse surface effects incidental to underground mines, so that mined lands are reclaimed to a usable condition which is readily adaptable for alternate land uses and create no danger to public health or safety" (Section 2733).

   Further, SMARA observes that surface mining takes place in diverse areas where environmental conditions are significantly different, and that reclamation specifications may vary accordingly.

2.2.3.2.2 Reclamation Objectives and Goals

1. The objectives of reclamation are to ensure that the site is left in a condition that: (1) allows reuse consistent with premining uses; (2) does not pose a threat to public health and safety; (3) protects air and water quality; and (4) encourages natural establishment of vegetation that would provide productive wildlife habitat; and (5) reduces long-term visual impacts. The reclamation plan for the Briggs Project is designed to achieve specific goals to meet these ultimate objectives:
   - Provide a diversity of habitat for post-mining land use.
   - Stabilize the soil surface to prevent wind and/or water erosion.
   - Place materials excavated during mining operations in a manner that would not pose a hazard to public health and safety.
   - Implement a revegetation program with a long-term goal of establishing a native vegetation community similar to existing conditions. The

short-term goal for revegetation bond release would be to provide grading and ground surface preparation, and revegetation to the extent practical in a manner that maximizes the acceleration of natural revegetation over time.

The post-mining topography of the site is shown in Figures 2.22 and 2.23. Table 2.10 summarizes reclamation measures planned for the various site facilities.

2.2.3.2.3 Post-Mining Land Use

1. The Briggs Project is located in an undeveloped and remote area on the west side of the Panamint Range. Access to the site is available only via unpaved roads. Current land uses in the vicinity are mainly wildlife habitat, dispersed recreational (hiking and off-road vehicle) activities, and mineral exploration and development.

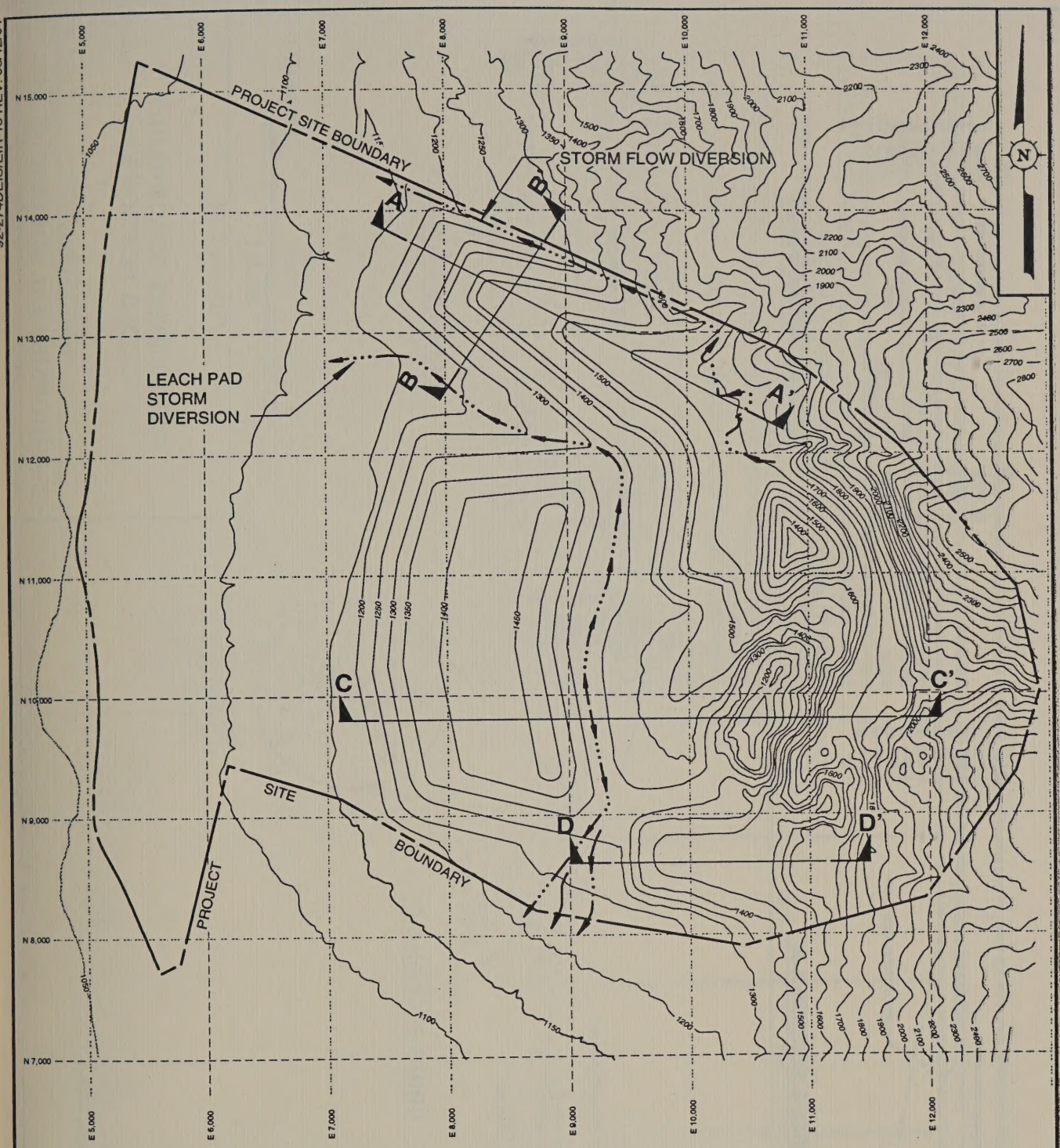
2. Based on reclamation goals of BLM and SMARA, post-mining use of the site must involve reinstatement of the previous land use. In accordance with this, the reclamation plan has been prepared to provide stable postmining conditions that are consistent with current land uses in a technically sound and cost-effective manner.

3. At cessation of mining activities, material with sub-economic gold mineralization would remain in the pit walls and floor, and at waste rock pile locations where protore would be placed as discussed in Section 2.2.2.2. Planned reclamation measures would allow access to this material for future recovery in the event technology advancements and/or market conditions make such an effort feasible. The site would also be appropriate for wildlife and recreational land uses provided reclamation goals are met. The project's reclamation plan would be implemented in such a manner that would not overly restrict or impede these future uses, and includes the proper precautions to provide for public safety and protection of wildlife.

2.2.3.2.4 Site Considerations

1. A number of site characteristics were considered in the determination of reclamation requirements and procedures for the Briggs Project site. These characteristics included:

   - **Climate** - The climate of the project area is a desert type with occasional winter rains and summer thunderstorms. The mean annual precipitation is less than 4 inches (Cedar Creek Associates, Inc., 1993c), making the area one of the lowest rainfall regions in California (and the United States). The low precipitation gives rise to drought soil conditions. Therefore, techniques would be oriented toward proper seedbed preparation and scheduled to take advantage of regional precipitation patterns. Species selected for revegetation would exhibit drought tolerant characteristics.



NOTE: SEE FIGURE 2.23 FOR CROSS SECTIONS.

0 1,200 2,400 FEET
SCALE

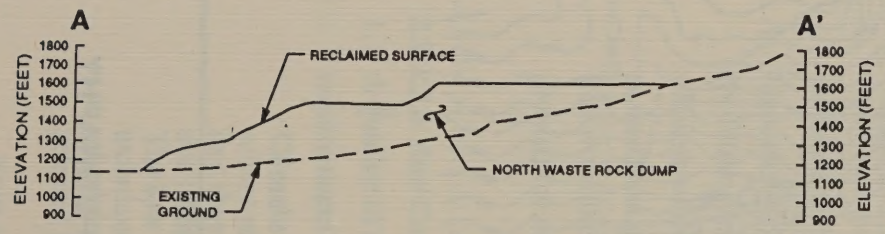
REFERENCE: CANYON, 1993b.

FIGURE 2.22

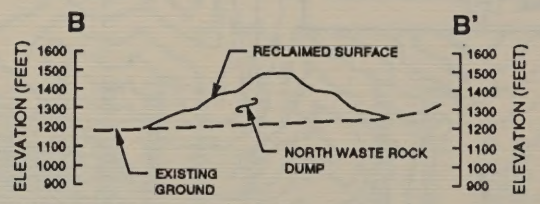
POST-MINING TOPOGRAPHY

BRIGGS PROJECT

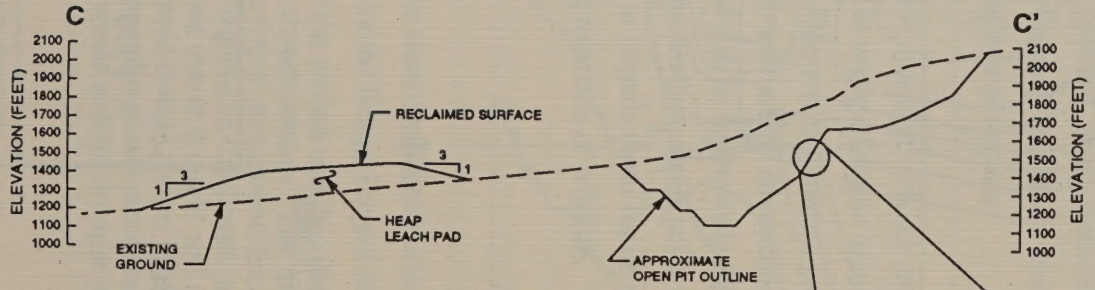
ENVIRONMENTAL SOLUTIONS, INC.



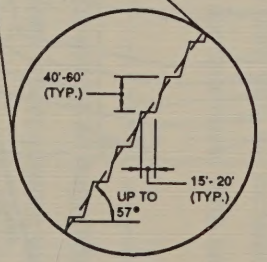
CROSS SECTION A-A'



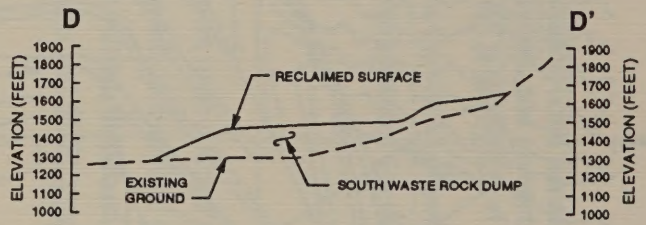
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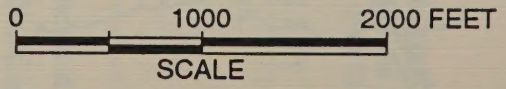
CROSS SECTION C-C'



TYPICAL PIT SLOPE DETAIL
(NOT TO SCALE)



CROSS SECTION D-D'



NOTE:
SEE FIGURE 2.22 FOR CROSS SECTION LOCATIONS.

REFERENCE: CANYON, 1993b.

FIGURE 2.23

POST-MINING TOPOGRAPHY CROSS SECTIONS

BRIGGS PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

TABLE 2.10

SUMMARY OF RECLAMATION ACTIVITIES

AREA	DISTURBANCE (acres)	GROWTH MEDIA DISTRIBUTION (acres)	REVEGETATION (acres)	TIME REQUIRED[1] (months)	RECLAMATION MEASURES
Mine Pit	112	0	0	3	• The mine pit would be left intact for potential-future mining use. • Barriers consisting of piles of large rock would be placed at the top of the pit ramp to preclude vehicle access. • The ramp inside the pit would be left intact to allow wildlife a means of escape. • Internal pit walls would be designed for stability. • Flow from Redlands Canyon would be directed into the pit.
Waste Rock Dumps • Tops and Benches • Slopes	 61 65	 61 0	 61 0	 6 3	• Waste rock dumps would be benched to provide an overall slope angle of 2.5H:1V for long-term stability. • Final stages of rock placement and/or regrading would occur in a manner that would break up the straight-line and man-made appearance. • The tops and benches would be constructed to slope away from the faces to control drainage. • Berms would be created along the crest of the dump and outer edges of each bench. • Trenches (microcatchments) would be created to increase the potential for plant establishment. • Compacted surfaces would be lightly scarified to allow applied growth media to transition into the compacted zone without unnecessary reduction of water holding capacity. • Growth media would be applied and seedbed preparation and reseeding would follow grading on the top and benches of the dumps.
Process Water Ponds	11	11	11	3	• Remaining liquids would be evaporated. • Pumps, piping and equipment would be removed from the site. • Sediments in the ponds would be tested for toxics. Sediments would be removed from the site and handled in accordance with applicable regulations. If testing indicates they are not toxic, they may be disposed of onsite if acceptable to BLM, the County, and RWQCB. • Synthetic liners would be removed from the site and handled in accordance with applicable regulations, or folded into the bottom of the ponds and buried if acceptable to BLM and the County. • Ponds would be backfilled and graded to blend with surrounding topography and provide free surface drainage. • Growth media application, seedbed preparation and reseeding would follow grading.
Heap Leach Pad	138[2]	138	138	12	• Heap would be rinsed to remove cyanide. • Heap leach slopes would be regraded to round off the crest and benches and blend the overall slope. The final overall slope angle would be about 3H:1V. • Trenches (microcatchments) would be created on the top of the heap to aid in revegetation. • Following grading, growth media application, seedbed preparation and reseeding would occur. • The fence would remain in place around heap until surface is considered stable and vegetation is established.

(1) Estimated time to complete reclamation measures following decommissioning. Time to complete reseeding may vary to accommodate seeding during an appropriate season. Concurrent reclamation would also occur where possible throughout site construction and operation.

(2) The total disturbance for heap leach construction is estimated to be about 138 acres. An additional approximately 7 acres, all of which would be reclaimed, could be disturbed due to regrading of the pile slopes.

TABLE 2.10
SUMMARY OF RECLAMATION ACTIVITIES
(Continued)

AREA	DISTURBANCE (acres)	GROWTH MEDIA DISTRIBUTION (acres)	REVEGETATION (acres)	TIME REQUIRED[1] (months)	RECLAMATION MEASURES
Haul Roads and Ancillary Facilities	38	38	38	6	• Unless requested to do otherwise by BLM, Canyon would reclaim all site roads. • Roads would be ripped where necessary to relieve compaction and regraded to blend with surrounding topography. Culverts would be removed and drainage patterns restored. • Where necessary, rock blankets, water bars or other measures would be installed to inhibit erosion. • Buildings, machinery and equipment would be removed from the site. • Concrete foundations would be broken and removed from the site or buried in accordance with procedures acceptable to BLM and the County. • Building pads would be regraded to break up straight lines and blend with surrounding contours. • Growth media application, seedbed preparation and reseeding of disturbed areas would occur following grading.
Water Supply and Monitoring Wells	1	0	1	3	• Wells not formally transferred to BLM would be permanently closed by filling, plugging and capping, in accordance with applicable regulations and ordinances. • Equipment would be dismantled and taken offsite. • Grading would not be required, but the sites would be shaped to eliminate surface irregularities before revegetation.
Storm Diversion Facilities	13	13	13	6	• Constructed diversions would be reclaimed, except those upgradient from the heap leach pad and north waste rock dump. • The disturbed areas would be graded to re-established drainage patterns. • Growth media would be applied and the surface revegetated.
Borrow Area	47	47[3]	47[3]	3	• Borrow area would be graded to blend with surrounding contours and to have gentle slopes (e.g., 5H:IV). • If one of the two potential areas of the playa surface is used, a non-toxic dust palliative may be applied if necessary for dust control and approved by the COE. In addition, an approximately 1-foot high clay berm would be constructed around the borrow excavation to prevent the surrounding area from draining into the excavation. • The south borrow area, if used, would require an approximately 1,000-foot long access route from Wingate Road. If gravel and geotextile is used on this access route, the gravel would be recovered to the extent practical during reclamation and deposited on the heap leach pad or waste rock dump. The access route would be disced, if necessary, to relieve surface compaction. • If the onsite location is used, trenches would be created to increase the potential for plant establishment. After grading, growth media application, seedbed preparation and reseeding would occur.
Growth Media Stockpiles	19	0	19	3	• Growth media stockpiles would be stabilized from erosion by interim vegetation, contouring, and other measures, as necessary. • Stockpile disturbances would be graded to blend with surrounding terrain following removal of growth media. • The graded surface would be ripped to relieve compaction and revegetated.
TOTAL	**505**	**308**	**328**	--	--

92-274 (3/17/95/dh)

(1) Estimated time to complete reclamation measures following decommissioning. Time to complete reseeding may vary to accommodate seeding during an appropriate season. Concurrent reclamation would also occur where possible throughout site construction and operation.

(3) If one of the playa borrow areas is used, reclamation would not include growth media distribution or revegetation because the playa is naturally barren (free of vegetation).

- **Topography** - Topography on the alluvial fan is comparatively gentle, which would aid in soil salvage operations during construction of the leach pad and other facilities that would be located on the alluvial fan surface. The area where the mine pit and eastern portions of the waste rock dumps would be located is characterized by very steep slopes, which have been dissected by canyons and ephemeral drainages. Little or no soil exists in these steep areas, and safe and efficient salvage operations are not feasible under these conditions. The steep topography of the Panamint Range also results in a rugged appearance and limits use of the eastern portion of the site for recreation.
- **Soils** - Chemical and physical characteristics of site soils would limit potential salvage volumes. Surface and upper subsurface soil horizons typically exhibit loamy sand to sandy loam textures with moderate to high rock fragment contents. The textural characteristics of these soils would aid plant establishment because of high infiltration rates and good permeabilities. The high rock content would aid in decreasing soil losses due to wind and water erosion. The drawback to the onsite soils is their low water-holding capacity. Soil conditions at the site are favorable for stabilization by grading and surface preparation (e.g., ripping), without relying on revegetation. ~~Under natural conditions, vegetation does not play a prominent role in soil stabilization.~~
- **Vegetation** - The presence of onsite vegetation indicates the potential for successful revegetation under natural conditions. However, the low species diversity substantially limits practical efforts to maximize short-term revegetation success. Few species occur in the vicinity that may be amenable to artificial nursery propagation or transplanting. Canyon has not proposed transplanting or nursery propagation of any plants, but such efforts are recommended as further discussed in Section ~~4.5.6~~ 4.4.6. At the potential borrow areas on the playa, the lack of vegetation would simplify reclamation efforts if one of these sites is used.
- **Wildlife** - Wildlife use in the area is limited because of the natural low vegetation density and diversity and low productivity. Grazing by domestic animals does not occur in the vicinity.

2.2.3.3 Concurrent Reclamation and Revegetation Test Plots

1. Concurrent reclamation would occur during the life of the mine on areas where construction and operational disturbances have ended, and no additional disturbance is planned. Concurrent reclamation would be completed to: (1) minimize the areas disturbed at any one time; (2) shorten the time frame between disturbance and the onset of reclamation activities; and (3) maximize the potential for successful revegetation.

2. Concurrent reclamation would proceed as soon as practical at each disturbance following cessation of operations. Candidate areas for concurrent reclamation include, but are not

limited to the borrow area if the onsite location is used, waste rock dumps, water production well areas, and abandoned access roads and drainage ditches.

3. Also concurrent with project operations, Canyon would conduct revegetation test plots to mimic actual conditions under which final reclamation would occur. The test plots would assist in determining adaptability of plant species to varying site conditions and evaluate potential benefits of mulching and other revegetation measures. Sites subject to concurrent reclamation would be given first consideration as test plot sites. Canyon would coordinate closely with BLM and the County in the design, performance and evaluation of test plots. Test plots would be constructed as soon as feasible following the beginning of mining operations to maximize the amount of data that can be obtained prior to final reclamation. Canyon would provide a detailed plan of test plot activities and locations for approval by BLM and the County within six months of initiating construction activities. The test plot program would include use of ore residue as a subbase to evaluate whether special measures may be needed at the heap leach pad due to build up of salts in this material from leaching and rinsing with high TDS water.

4. Canyon would monitor the test plots on an annual basis to track vegetation growth and establishment. At the end of each growing season, test plots would be statistically evaluated for density and cover percentage. Results would be included in an annual report to BLM and the County. Each report would include appropriate conclusions and recommendations.

2.2.3.4 Reclamation Measures

1. Canyon would employ reclamation measures as an active part of ongoing operations, in addition to specific activities at project completion. The following sections summarize techniques which Canyon would use to close and reclaim each of the proposed project components at the Briggs site. These techniques may be modified in response to the revegetation test plot program, changes in the mining plan, or advances in technology. Modifications would be made with the concurrence of BLM and the County.

2.2.3.4.1 Decommissioning of Facilities

Mine Pit

1. The primary objective of mine pit closure and reclamation would be to leave the pit in an overall stable condition, which would not contribute to offsite sedimentation or pollution.

Backfilling of the mine pit is not proposed (backfilling alternatives are evaluated in Section 2.3 and Chapter 4.0).

2. The access road to the mine pit would be permanently closed and revegetated. The ramp inside the pit would be left to allow wildlife a means of escape. A barrier would be constructed of rock piles at the top of the pit ramp to preclude vehicle access. Internal pit walls would be designed for stability, based on rock strength and structure properties. It is expected that small, infrequent rock falls and erosion would result in the deposition of material on safety benches after mining. This would eventually result in the formation of rock faces and talus slopes which would contribute to visual diversity compatible with the surrounding landscape.

3. Redlands Canyon drainage would be directed into the pit following closure. Although surface flow from the Redlands Canyon occurs infrequently, large flows are possible due to storms that would be expected to occur on occasion (e.g., 100-year storms) over the long term. Because the pit will be constructed in competent bedrock, the erosion rate of the pit wall would be very slow. Over time, flood flows from Redlands Canyon would fill the pit with debris similar to that currently found downslope in the alluvial fan. Based on estimates of average sediment loads for the Redlands Canyon drainage (WESTEC, Inc., 1993b), as discussed further in Section 3.3.2, the mine pit would be expected to fill with sediment up to the low portion of the pit wall over a period ranging from less than two decades up to about 100 years. Natural infilling of the pit over a relatively short period of time is possible because: (1) the portion of the mine pit that would be a closed depression is relatively small (i.e., about 50 acres); and (2) the mine pit is located at the mouth of a six-square mile watershed, where sediment loads are extreme on the infrequent occasions of substantial surface water flow.

4. The duration and amount of standing water that may occur in the mine pit before it eventually is filled by sediment is discussed in Section 4.3.1. The depth of water and length of time water would stand before evaporating or infiltrating would depend upon how much sediment has collected in the pit. Standing water would be the deepest and stay the longest initially when there is little sediment in the pit. Estimates of the length of time water may stand in the pit are discussed in Section 4.3.1.

5. As further discussed in Section 4.3.1, the quality of water is expected to be suitable for wildlife use. During the post reclamation monitoring period, any standing water in the mine pit would be sampled and analyzed to assure that the quality is suitable for wildlife uses. Water not suitable for wildlife purposes would be rectified to meet applicable standards.

Waste Rock Dumps

1. Waste rock dumps would be constructed with intermediate benches to provide an overall slope of 2.5H:1V. During final stages of material placement for each lift of waste rock and/or as part of regrading, rock would be placed to break up the straight line man-made appearance.

2. The top surface of each dump and bench would be sloped back to prevent runoff. In addition, a small berm composed of waste rock would be constructed at the crest of the waste rock dumps, and along the outer edges of each bench to prevent runoff and aid in retaining applied soil material. As for final waste rock placement and regrading, the berm would be configured to avoid a straight-line appearance that could starkly contrast with natural landforms. The top surface of the waste rock dumps would be contoured to create a gently undulating landform and establish drainage patterns. The top compacted surface of the dumps would be lightly scarified (i.e., by disking or shallow ripping) prior to placement of growth media. However, deep ripping of the compacted surface is not proposed because the compacted material is expected to provide an increased moisture storage capability as compared to uncompacted waste rock. The uncompacted waste rock will contain relatively few fines and will have large voids between rock particles that would not be favorable to moisture retention.

3. V-shaped trenches would be excavated in the waste rock dumps to serve as water harvesting features, increasing the potential for plant establishment, and serving to decrease wind erosion potential. Following grading, growth media would be evenly applied, excluding berms, and then planted and mulched.

4. As it is expected that there would be a shortage of growth media, Canyon proposes to forego resoiling and reseeding of the slopes of the waste rock dumps. Growth media would be conserved for use in flatter areas where revegetation success potential is comparatively greater. The post reclamation slope and bench configuration of the waste rock dumps would be designed for stability and to break up the slope length to reduce rutting and erosion.

5. Areas of the waste rock piles that contain protore would be reclaimed at the same time and using the same procedures as the remainder of the waste rock. Records of the protore grades (i.e., gold concentrations) and locations would be maintained so that its economic viability could be assessed and its recovery facilitated in the future. Other than selected initial placement of the material as discussed in Section 2.2.2.2, special measures to retain an access route to the protore areas of the pile would not be necessary. If recovery of the material were

proposed after closure of the Briggs Project, it would occur under a different project proposal that would include access.

6. Should one waste rock dump or a sizable portion thereof be completely constructed prior to cessation of mining, that dump would be closed and reclaimed concurrently with operations.

Heap Leach Pad, Solution Ponds, and Pipeline/Ditch

1. Heap leach detoxification would take place after all economic metal values have been leached. Economic leaching may take more than two years after the last ore is placed. Once gold recovery ceases, it is expected that about one pore volume of water would need to be percolated through the heap to detoxify the material. Testing of the rinse effluent would occur as this rinse volume is approached. The goal of rinsing would be to leave the heap in a manner that would not pose a threat to water resources. Protection against unhealthful human or wildlife exposure would be assured coincident with this goal because the water quality criteria for cyanide is very low.

2. To initiate closure, the heap would be allowed to drain removing processing solution. Spent ore on the heap pile would be detoxified by circulating rinse water until residual cyanide concentrations are reduced to levels stipulated by the RWQCB. Chemical or biological detoxification may also be used to comply with final closure standards. Rinsing would be achieved using the same piping and distribution systems as operation of the pad, and may take several months to complete. Rinse water would be circulated through the lined ponds and recycled through the heap. If, after rinsing, testing indicates that the heap does not satisfy designated closure criteria, the heap would be rinsed again, and retested until necessary requirements are met. Once residual cyanide levels are below applicable standards, the remaining water in the heap would be disposed through evaporation by spraying water on the surface of the heap. Pond and pipe systems would be left in place until heap rinsing is deemed complete by the RWQCB.

3. There are several proven technologies for cyanide destruction. These include treatment with hydrogen peroxide or hypochlorite. It is anticipated that an adequately low cyanide concentration to assure protection of water resources would be attainable using existing technology. In addition, there are emerging technologies that may be proven by the time the ore heap is ready for closure. Throughout operations, Canyon would keep informed on developments in these currently emerging technologies so that their potential applicability to

the Briggs Project is considered. Specific measures that would be used would be determined in consultation with the RWQCB, based on technologies available at the time detoxification is implemented.

4. The specific rinsing criteria and analysis procedures for confirming that the criteria are met will be mandated by the RWQCB and included in the Waste Discharge Order required to operate the project. Based on discussions with the RWQCB staff, the following preliminary criteria for rinsing could be required:

   - Less than 1.0 milligrams per liter (mg/L) total cyanide and less than 0.2 mg/L weak acid dissociable cyanide in rinse water from the leach pad.
   - Less than 2.5 milligrams per kilogram (mg/kg) total cyanide and 0.5 mg/kg weak acid dissociable cyanide in soluble forms in the ore residue.
   - Less than 10.0 mg/kg total cyanide after extraction of soluble forms.

   Because Waste Discharge Orders are issued for five-year terms and operations are expected to last six years, the rinsing criteria will not be final until about one year before project decommissioning. The RWQCB could issue new criteria in conjunction with the five-year permit renewal supported by information and technology available at that time. BLM has guidelines for heap leach detoxification until the rinsing effluent has a pH of less than 9.0 and a weak acid dissociable cyanide concentration of less than 0.2 mg/L. BLM's guidelines are not intended to supersede the criteria that would be prescribed by the RWQCB. In the unforeseen event that rinsing criteria cannot be met ~~and it cannot be demonstrated that the rinsed ore heap does not pose a threat to water resources~~, the RWQCB ~~would~~ could require additional measures for protection of water resources ~~(e.g., encapsulation)~~.

5. The heap would be constructed with overall sideslopes of about 2.5:1V. Final reclamation of the heap would include of recontouring to round off the crests and benches and blend the overall slope. The final slope angle would be about 3H:1V. Following regrading, growth media would be placed on the heap and seedbed preparation and reseeding would occur. The fence around the heap would be removed when the surface is stable and vegetation meets standards discussed in Section 2.2.3.4.3, unless otherwise directed by BLM or the County.

6. The ponds would be reclaimed after the heap is detoxified. Liquids remaining in the ponds would be evaporated. All remaining reagents would be removed from the site. Sludge that accumulated in the ponds would be collected, tested, and disposed of in manner consistent with state and federal regulations. Process pond liners and covers would be removed for offsite disposal or buried in accordance with procedures acceptable to BLM and the County. Pond embankment materials would be pushed into the pond excavation and edge areas would

be contoured to blend with surrounding terrain. Salvaged growth media would be distributed over the disturbed area and seedbed preparation and reseeding would be performed.

7. Pipelines serving the leach pad and ponds would be removed during pond decommissioning. Pipes would be rinsed, disassembled, and salvaged or appropriately disposed. Liners in the solution piping ditch would be removed for offsite disposal or buried in accordance with procedures acceptable to BLM and the County. The ditch would be buried coincident with regrading of the heap leach slopes. Salvaged growth media would be distributed over the disturbed areas and reseeding would be performed.

Ancillary Facilities

1. All building, structures, fuel and oil storage tanks, and equipment not needed for continued reclamation would be removed from the site. Concrete footings, slabs, and foundations would be broken and removed from the site or buried onsite in accordance with procedures acceptable to BLM and the County. Disturbed areas would be regraded, covered with growth media, and reseeded. Any onsite disposal may require Canyon to obtain a landfill permit.

2. Site roads, parking lots and building pads would be regraded to breakup straight line slopes, establish appropriate drainage patterns, and blend with surrounding terrain. Where necessary to relieve compaction, surfaces would be ripped. Disturbed areas would be covered with growth media and reseeded.

3. Water wells would be decommissioned, grouted and capped in a manner consistent with applicable state and County regulations. Approval for grouting of water wells would be obtained from DEHS prior to initiating this work. Aboveground portions of the water pipelines would be removed. Buried pipelines would be abandoned in place. Disturbance at the well field would be minimal so growth media would not be removed from these areas. Seedbed preparation would occur, as required, and disturbances would be revegetated. Surfaces over buried portions of the pipeline would be regraded and revegetated as a part of initial construction.

4. Underground utilities would be capped below ground level. Septic tanks would be evacuated by a licensed contractor and backfilled with sand, cement or equivalent. Approval for decommissioning of septic systems would be obtained from DEHS prior to initiating this work.

Borrow Area

1. If the onsite borrow area is used, the sides of the excavation would be left with low slopes (e.g., 5H:1V) that blend with adjacent topography. The area would be graded to drain, except microcatchments would be provided to enhance revegetation. The low point of the excavation would be backfilled with waste rock after all phases of borrow are completed if necessary to achieve this drainage configuration. The disturbed area would be ripped to relieve compaction, and growth media would be applied. The seedbed would be prepared and the area would be reseeded. Portions of the borrow area that would not be subject to additional disturbance would be reclaimed following each phase of borrow activity.

2. Both of the potential playa borrow areas occur on unvegetated clay soil. If one of the playa borrow areas is used, reclamation would primarily consist of grading the excavation area to provide a configuration that minimizes effects to wildlife. In addition, a nontoxic dust palliative may be applied to the disturbed surface if necessary for dust control and the application is approved by the COE. Grading would consist of leaving the sides of the excavation with low slopes (e.g., 5H:1V) and constructing an approximately 1-foot high clay berm around the outside of the excavation to prevent it from draining the adjacent playa surface. The bottom and sides of the excavation would be ripped and/or disced, if necessary, to relieve compaction.

3. If the south borrow area is used, an approximately 1,000-foot long access route would be required to reach the borrow area from Wingate Road as discussed in Section 2.2.2.5.6. Because of the limited amount of disturbance that would occur for this access route (about one-third of an acre) and the low vegetation density in this area (about 6 percent cover), disturbance to vegetation would be minimal. Reclamation of the access route would include discing the disturbed surface, if necessary, to relieve surface compaction. If soil conditions at this access route require that geotextile and gravel be used to support the haul vehicles as discussed in Section 2.2.2.5.6, the geotextile and gravel would be removed to the extent practical (i.e., to the extent that removal can occur without increasing surface disturbance) prior to discing.

2.2.3.4.2 Revegetation

1. Revegetation would be conducted in two phases: (1) interim revegetation following construction and during mining operations; and (2) final revegetation after mining operations cease. Criteria for determining areas that would be seeded during operations include:
   - Areas that would not be redisturbed within three years.
   - Areas where surface materials have soil properties that might support vegetation.

- Areas not used as part of ongoing operations.
- Growth media stockpiles.

2. The seed mix and application rate would be developed in consultation with BLM and the County. ~~The seed mix would be drawn from species listed in Appendix E, Table E.1.~~ Exotic species would be avoided. The mix would emphasize reestablishment of a plant community similar to the existing site conditions. However, as discussed in the introduction to this section, restoration of species density and diversity is expected to occur primarily through natural revegetation over the long term (i.e., decades). Depending on the results of test plots, fertilizers may be applied as part of final revegetation to enhance short- and long-term vegetation development. If used, fertilizer would by selected and/or applied to minimize the potential to encourage weed growth.

Soil Salvage and Stockpiling

1. Plant growth media at the Briggs Project site is available in limited quantities. It is generally classed as fair to poor, and certain areas of the site are too steep for safe soil salvage. These factors make available plant growth media a premium commodity that must be properly handled in order to preserve the resources for use in post mining reclamation.

2. Suitable soil materials would be salvaged from proposed project disturbances with the exception of the growth media stockpile sites and water well sites where the in situ soil horizons would not be substantially disturbed by project activities. Salvage would occur prior to construction disturbances to ensure that available suitable material is salvaged. However, it would not precede surface mining and associated activities by more than one year.

3. Growth media would be stockpiled primarily in one of the four designated stockpile areas shown on Figure 2.3, whichever is closest to the salvage location. Exceptions to this stockpiling method would occur at haul roads and stormwater channels where the salvaged growth media may be stored in berms immediately adjacent to the disturbance.

4. Growth media stockpiles would be stabilized from erosion by interim revegetation and contouring, and protected from operational disturbances. During construction, the surface of the stockpiles would be left in a roughed condition. Fertilizer would be evenly broadcast over the stockpile and the stockpile would be seeded. If the vegetative community fails to

perpetuate itself, Canyon would stabilize the stockpile surface using chemical binders and/or additional reseeding and mulching.

5. Because of the location of the site, it is expected that there would be a shortage of growth media available. Anticipated salvage volumes are provided in Table 2.11. Soils proposed to be disturbed are limited in potential salvage volume due to physical and chemical characteristics (see Section 3.2.3). Application of growth media would occur over flatter areas where the likelihood of successful revegetation is comparatively higher. Sufficient topsoil is expected to be salvaged for use on site disturbances except the mine pit and waste rock pile slopes.

6. It is recognized that stockpiling of growth media for an extended period of time can degrade the biological quality of the material making it infertile. However, Canyon would salvage suitable topsoil that can be practically obtained, because it is known that the material would at least have the physical properties to sustain growth and measures can be taken to mitigate biological deficiencies. The BLM and County would require that Canyon's approved reclamation plan specify procedures to be implemented for biological preservation of the material, including:
   - Scheduling growth media salvaging to precede the intended use of the disturbed area as closely as practical.
   - Management of growth media salvage, storage, and use in a manner that minimizes the portion of growth media that must be stockpiled for more than two years (e.g., tracking the age of stockpiled material).
   - Measures for reinoculating old stockpile material to the extent practical (e.g., mixing of older soil and newer soil during final placement, incorporation of biological amendments such as roots or commercially available inoculants).

Seedbed Preparation

1. Seedbed preparation would occur to provide surface conditions amenable to seed germination and seedling establishment to optimize reseeding efforts and to encourage long-term natural revegetation. Where disturbance has been light (i.e., around water well sites) or it is desirable to preserve native plants, tillage would be avoided or minimized. At sites where growth media has been compacted, more extensive tillage would be conducted.

2. Soil would be distributed over the site in a manner which: (1) achieves an approximate uniform thickness; (2) minimizes compaction and erosion; and (3) minimizes deterioration of

TABLE 2.11

ESTIMATED SALVAGE VOLUMES BY PROJECT COMPONENT[1]

PROJECT COMPONENT	ACRES DISTURBED	APPROXIMATE CUBIC YARDS SALVAGED
Mine Pit	112	8,250
Waste Rock Dumps	126	287,800
Process Water Ponds	11	26,100
Heap Leach Pad	138	270,500
Haul Roads and Ancillary Facilities	38	65,200
Water Supply Wells	1	0
Storm Diversion Facilities	13	21,000
Borrow Area	47	84,900
Growth Media Stockpiles	19	0
TOTAL	**505**	**763,750**

92-274 (4/29/95/cm)

(1) These quantities are estimates only. Actual amounts of growth media salvaged may vary depending on quantity and quality of soils encountered.

the biological, physical, and chemical properties of the soil, to the degree possible. Concurrent with grading and/or ripping, soil samples would be collected for analyses and fertilization recommendations.

3. Seedbed preparation would be conducted within a short time frame (ideally 30 to 45 days prior to seeding), to minimize the effects of wind and water erosion prior to establishment of vegetative cover.

Seeding Techniques

1. Broadcast seeding would occur in areas of disturbance where access to, or size of the area to be seeded makes drill seeding impractical. This may occur in particular for interim reclamation activities where relatively small areas may be involved. For these areas, the seedbed would be roughened manually or mechanically prior to seed application, and again to cover the seed. Mulch would then be applied to the area. Mulching could be performed using straw crimped into the prepared surface ~~anchored with a chemical tackifier, hydromulch~~ or other standard mulching procedures.

2. The second method of seed application would be drill seeding. This method is suited to relatively large open areas without access restrictions. After application of fertilizer, if necessary, and disking, the seed drill would be used for planting. The seed drill would be equipped with drag chains or packer-wheels so that seeds are covered concurrent with their application. Following seeding, mulch would be applied as described above.

2.2.3.4.3 Maintenance, Management, and Monitoring of Reclaimed Areas

1. Canyon would monitor the success of revegetation efforts and other aspects of the reclamation program until revegetation efforts are complete. Activities during the monitoring period may involve the following:
   - **Fencing** would be installed to control access until final reclamation is complete. Fencing that remains at the close of the project and at the end of reclamation monitoring period would be evaluated for continued need at the time. Fencing would be removed when reclamation is deemed complete or as otherwise instructed by BLM.
   - **Weed control measures**. Due to the current absence of weedy species onsite, a large-scale weed control program is not anticipated. Specific methods of weed control would be suited to prevalent conditions and subject to approval by BLM and the County. Mechanical or manual removal would be the preferred method, where practical. Efforts would

focus on minimizing the potential for weeds to set seed. However, preemergent herbicides would not be used unless determined to be necessary by BLM and the County.

- **Tracking** of vegetation growth and establishment to monitor success.
- **Replanting** may be necessary where initial efforts are not successful. Lack of plant establishment would be evaluated to determine the feasibility of further action.
- **Erosion control** sites showing evidence of excessive erosion or sedimentation, if any, would be protected by improving erosion protection systems with appropriate measures such as water bars or riprap.
- **Sampling** of precipitation that may be ponded in the bottom of the pit if rains have occurred. When water is present it would be analyzed for pH, electrical conductivity and dissolved metals.

2. The test plots that would be conducted during operations would be designed to model various post mining surface conditions that will occur (e.g., slope aspect, subgrade material) and to test revegetation success of different species and use of mulch. Results of the test plots would be used to finalize procedures that would be carried out for revegetation.

3. Given the objectives of the reclamation plan, the parameter selected for monitoring revegetation success is density of the perennial herbaceous and shrub species in the area. The intent of monitoring would not be to determine the total amount of vegetation in the reclaimed area, since the actual amount of vegetation may be greater than that identified during monitoring, depending on the time of year, soil chemistry and the annual climatic conditions.

4. To establish the appropriate sample size to ensure a statistically valid sample of the vegetative population with a 90 percent confidence interval, an initial sampling of the density, cover and diversity of the pre-disturbance perennial herbaceous and shrub species would be performed prior to construction.

5. A preliminary specific plot size has been designated to address the site-specific conditions. Sample sites consisting of nested, 1 meter square to 16 meter square plots would be established for the initial sampling and the revegetation success sampling. The actual number of sample sites that would be used during the monitoring of the revegetation activities would be determined based on the results of the initial site sampling. Sample plots will be of sufficient size and number to have a confidence level of at least 80 percent.

6. Monitoring would be conducted at least yearly. Sampling over a minimum of three monitoring periods would be conducted. Results from the sampling would be analyzed to

establish trends in the revegetation success. When the results of the monitoring show that there has been an establishment of a minimum of 20 percent density and minimum of 15 percent cover/canopy and diversity of the perennial shrub and herbaceous vegetation, as compared to the pre-disturbance control plots determined by the initial sampling, then revegetation will be determined successful. Comparisons would be made until performance standards are met provided that, during the last two years, there has been no human intervention including, for example, irrigation, fertilization or weeding.

7. In the event of failure to meet the revegetation success criteria within five years following completion of reclamation, BLM and the County would be consulted regarding remedial measures. Tilling, mulching, hydroseeding, and other alternatives would be considered, and remediation would include these or other measures determined to be appropriate pursuant to County and BLM consultation. Should the success criteria continue not to be met following two good faith attempts at remediation, Canyon would petition for release of bonding based on the presumption that currently available technology is insufficient to meet the proposed success criteria.

2.2.3.5 Public Safety

1. Public safety during mining operations would be provided by restricting access to operating areas with fencing and gates. Public safety would be maintained following project completion by reclamation procedures that would include: (1) slope stabilization where required; (2) grading to minimize surface hazards; (3) removal of buildings, structures, and equipment; (4) use of barriers in areas that would otherwise provide vehicle access into mine pit, and other areas where appropriate to prevent random access by domestic animal and humans; and (5) posting of warning signs to advise the public of site conditions.

2. Fencing would be dismantled around areas that have been revegetated after vegetation has matured to the point where it can withstand wildlife activity. The determination of when fencing should be removed would be made by BLM and the County.

2.2.3.6 Schedule

1. Site closure and reclamation would begin when individual project facilities are no longer required for mine operations, or when the project site is decommissioned following mining and ore processing. General closure and reclamation schedules for individual facilities are

included in Table 2.10. It is anticipated that final reclamation activities would begin about the year 2001. The actual time will depend on when final permits and approvals for the project are obtained, on future onsite conditions, mining and ore processing schedules, equipment and material availability, and labor supply; none of which can be determined at this time. Canyon would employ reclamation, to the extent possible, concurrent with mining operations.

2. Grading activities may ordinarily occur during any month of the year; however, resoiling and revegetation activities are somewhat limited with respect to the time of year they can be completed. Seeding would take place during the late summer or fall. Site conditions and/or yearly climatic variations may require schedule modifications to achieve revegetation success.

3. Offsite mitigation, as discussed in Section 2.2.4, would be completed within five years of BLM's Record of Decision.

2.2.3.7 Financial Assurance

1. BLM policy requires financial assurance for cyanide heap leach operations on public land. The SMARA requires financial assurance for mining operations requiring a reclamation permit. Posting of financial assurance prior to initiation of construction activities and project operation ensures that money is available if agency involvement is required to complete any reclamation activities.

2. The detailed reclamation plan for the Briggs Project will include an estimate of costs that would be incurred to complete all of the reclamation activities including, but not limited to: (1) rinsing of the ore residue on the heap leach pad; (2) removal of buildings, structures and equipment; (3) regrading; (4) stabilizing drainages; (5) discing or ripping to relieve compaction; (6) growth media placement; (7) revegetation measures; and (8) post-reclamation monitoring. The estimated costs must reflect prevailing rates for a third party to complete the work including labor, equipment, materials, taxes, insurance, management oversight and reasonable contractor profit. A detailed basis for the estimate must be provided (e.g., cubic yards of earth to be moved during regrading, equipment hours required, etc.). Based on experience with similar operations in the arid southwest, BLM anticipates that final reclamation costs, including administration of the contract, would average approximately $4,000 per acre. At this rate, the amount of financial assurance required for the proposed 505 acres of surface disturbance would be about $2 million. The actual amount would be based on the reclamation estimate and requirements discussed in this section.

3. The amount of financial assurance that would be required of the project proponent would be based on the estimated reclamation costs. The SMARA requires that the amount of financial assurance provided at any given time be sufficient to perform reclamation according to the approved reclamation plan on disturbances that have not yet been reclaimed. This requirement would satisfy BLM's policy for financial assurance. A surety bond, irrevocable letter of credit, or other financial guarantee acceptable to BLM and the County would be required. A common instrument of financial assurance for reclamation would be used to satisfy BLM, County and Department of Conservation requirements.

~~4. BLM's bonding requirements would take into account the cost of offsite reclamation work pending and completed. BLM expects the average cost per acre for offsite reclamation to be about the same as onsite reclamation.~~

4. ~~5.~~ The financial assurance would remain in effect for the duration of the project until reclamation activities are deemed complete. The amount of financial assurance would be reviewed annually and adjusted if necessary to account for new lands disturbed, inflation, and reclamation completed.

5. ~~6.~~ Financial assurance for the Proposed Action would also be required by the RWQCB~~,~~. The RWQCB financial assurance requirements encompass closure and postclosure monitoring activities, and financial assurance for potential corrective actions, as further discussed in Section 4.3.3.

2.2.4 OFFSITE MITIGATION

1. ~~Consistent with their environmental protection policy,~~ Canyon has incorporated an offsite environmental mitigation plan into the Proposed Action that would offset ~~compensate, both in quantity and quality, for~~ onsite disturbances that would not be revegetated as part of reclamation. Canyon's Proposed Action includes performing land reclamation in the Panamint Valley area and vicinity. This program would be in cooperation with BLM, in carrying out on-the-ground reclamation and environmental remediation efforts in the area. The final details of the proposal remain to be developed. However, the roles, responsibilities and the objectives of the offsite mitigation plan have already been determined. The selection of sites where activities would occur would be determined by mutual agreement between BLM and Canyon. BLM would be responsible for ~~selecting the sites and other~~ administrative activities of the offsite mitigation efforts (e.g., real and personal property ownership

clearance, regulatory compliance and environmental permitting, etc.). Canyon would provide the funding and/or the labor. The sites would be reclaimed to BLM standards. The specific measures to be implemented would also be determined in consultation with BLM and may include:

- Removal and appropriate disposal of aboveground buildings, equipment, waste and debris.
- Breaking up and/or burying of concrete foundations.
- Reshaping and recontouring land surfaces and reestablishing surface drainage patterns.
- Scarifying and reseeding reclaimed areas.

2. The overall goal of the offsite mitigation plan would be to enhance the multiple use of public lands offsite to offset ~~compensate for~~ long-term onsite impacts ~~onsite~~. The proposed activities would accomplish this goal by:

   - Reclaiming existing offsite vegetation and wildlife habitat disturbances. The ~~extent of offsite mitigation would be designed to compensate, both in quality and quantity, the amount of~~ acreage of offsite disturbance that would be revegetated would equal or exceed onsite surface disturbance that would not be revegetated as part of reclamation.
   - Improving the multiple land use value of the offsite areas by reducing hazards and encouraging the recovery of natural conditions over time. BLM has identified a number of candidate sites that currently represent a hazard to the public. Mitigation of hazards would be an important consideration in BLM's decision of sites to be reclaimed.
   - Reducing visual impacts on public lands within Panamint Valley through the removal of buildings, equipment, waste and debris, and other land restoration measures.
   - Reducing impacts on surface water resources through the removal of waste and debris that may degrade water quality, and through surface stabilization measures to control erosion.

3. Discussions of appropriate sites and specific measures for offsite reclamation are ongoing between Canyon and BLM. This Draft EIS/EIR discusses the objectives (performance goals) of the offsite mitigation plan. These objectives are qualitative by nature. Once these objectives are agreed upon, a quantitative plan (design criteria) implementing the objectives will be developed and documented in the Final EIS/EIR and BLM's Record of Decision. The offsite mitigation activities would be completed within five years of the Record of Decision. ~~As discussed in Section 2.2.3.7, BLM's bonding requirements would take into account the cost of offsite reclamation work pending and completed.~~

4. The offsite mitigation plan has been volunteered by Canyon in order to make their proposal environmentally superior to project alternatives that are less desirable from an operations viewpoint. Consistent with this intent, Canyon has included the offsite mitigation only in conjunction with the Proposed Action or the balanced waste rock piles alternative that is discussed in Section 2.3.4. Offsite mitigation has not been volunteered for the remaining alternatives that would not fully implement Canyon's objectives.

5. ~~Offsite mitigation is not permitted under SMARA and is not intended to substitute for legally required mine reclamation measures.~~ SMARA does not allow offsite mitigation as a substitute for onsite reclamation. The Briggs Project reclamation plan will meet all SMARA requirements. The offsite mitigation proposal exceeds SMARA requirements as it provides assistance for reclamation of orphaned disturbances unrelated to the Briggs Project.

2.3 ALTERNATIVES

2.3.1 OBJECTIVES OF ALTERNATIVE ANALYSIS

1. NEPA regulations require that an EIS include analysis of alternatives to the Proposed Action. The BLM's *National Environmental Policy Act Handbook* (BLM, 1988b) requires that an EIS describe the No Action (No Project) Alternative and all reasonable alternatives identified by the BLM to the same level of detail as the Proposed Action, and how each alternative, with the exception of the No Action Alternative, will generally accomplish the purpose and need of the proposed project. For NEPA purposes, reasonable alternatives include those that are practical or feasible from technical and economic standpoints (46 Federal Register 18026; 3/23/81, as amended, 51 Federal Register 15618; 4/25/86). The NEPA Handbook requires that an EIS describe alternatives considered but eliminated from detailed analysis and provide a brief rationale for their exclusion from consideration.

2. CEQA requires an EIR to describe a reasonable range of alternatives to the project, or to the location of the project, which could feasibly attain the basic project objectives, and evaluate the comparative merits of these reasonable alternatives (CEQA Guidelines §15126[d]). This discussion must focus on alternatives capable of eliminating any significant adverse environmental effects or reducing them to a level of less than significant. An EIR need not consider alternatives whose effect cannot be reasonably ascertained and whose implementation is remote and speculative.

3. The primary objective of the requirements for evaluation of alternatives is to allow informed decisions for discretionary actions (e.g., permit approvals) related to the proposed project. Review of available alternatives allows evaluation of other methods of operation or locations of facilities that may be technologically and economically feasible, and if such alternatives are available, evaluation of whether or not their implementation would be capable of significantly reducing or eliminating adverse effects of the Proposed Action.

4. Two aspects of the Proposed Action require a Clean Water Act Section 404 permit from the COE. These are: (1) the diversion of the Redlands Canyon drainage path around the mine pit; and (2) borrow of clay for leach pad liner construction, if one of the two playa borrow locations is used. It is anticipated that the diversion of Redlands Canyon will occur under the Nationwide General Permit program. Borrow from the playa would require an individual permit that would be considered by the COE under Section 404(b)(1) guidelines of 40 CFR Part 230. COE guidelines require analysis of alternatives to those actions requiring an individual permit. This section discusses alternatives to clay borrow from the playa to satisfy this requirement.

2.3.2 ALTERNATIVES CONSIDERED

1. A range of alternatives was considered during preliminary project design and preparation of this document. Alternatives investigated included:

   - Alternative mining techniques
   - Alternative waste rock and processed ore disposal
   - Alternative gold extraction techniques
   - Alternative project location and configurations
   - Alternative power supply
   - Alternatives to clay borrow from the playa
   - Reduced project size
   - Alternative ore beneficiation rates

   These alternatives were reviewed for potential feasibility and/or comparative environmental effects.

2.3.3 ALTERNATIVES CONSIDERED AND ELIMINATED

1. This section describes alternatives that were considered but were eliminated from further evaluation because they were determined to be not feasible, not capable of substantively reducing or eliminating environmental impacts, or not capable of satisfying the basic project objectives. Each of the alternatives evaluated is discussed in the following sections.

The discussion of each alternative includes a brief description of the comparable aspect of the Proposed Action to provide a basis for comparison.

2.3.3.1 Alternative Mining Techniques

2.3.3.1.1 Proposed Open Pit Procedure

1. The configuration and character of the Briggs Project ore body were evaluated to determine the optimal mining technique for the Proposed Action. The ore body occurs as a large mass of rock containing disseminated gold (i.e., the gold occurs as small dispersed particles). Ore occurs to a depth of several hundred feet. Overlying and interspersed with the ore is non-goldbearing waste rock that must be removed to access the ore.

2. The proposed open pit mining method will consist of excavating the ore, and waste rock required to access the ore. The ore material would be processed and the waste rock would be piled adjacent to the mine pit as discussed in Section 2.2. Strip mining and underground mining were evaluated as alternatives to the proposed open pit method.

2.3.3.1.2 Strip Mining Alternative

1. Strip mining is a linear method of removal that is typically applied to shallow deposits of minerals such as coal, potash, or uranium which occur in horizontal seams. Such deposits are usually flat-lying sedimentary formations that extend over a substantial area. Strip mining is practical for such deposits because their recovery generally requires shallow excavation over a relatively large and contiguous area. In strip mining, only a portion of the waste rock and ore is initially mined. Then, as mining advances to the adjacent portion of the ore body, the waste rock excavated during the advance is permanently disposed of by placing it in the excavated area created during the earlier stage of mining. In this manner, the mining process acts as a moving trench that is filled in behind the area of active extraction.

2. This method is physically impossible for deposits such as those at the Briggs site, which have a relatively limited areal extent in comparison to their depth. Because of the configuration and depth of the project ore body, there is insufficient space within the pit to dispose of waste rock from a portion of the pit being actively worked into an area where mining has been completed. Instead, all of the waste rock must be removed from the pit in order to expose the ore.

2.3.3.1.3 Underground Mining Alternative

1. Underground mining is typically suited to deep mineral deposits of high-grade veins or seams. Such deposits generally require removal of a relatively small volume of the host material in order to recover the mineral values. In the case of high-grade veins, values are typically confined to discrete structural discontinuities such as joints or fractures in a competent host rock. Underground tunnels can be excavated along these deposits, leaving most of the host rock in place to support the overburden. This method of mining is not applicable to disseminated ore bodies such as the one at the Briggs site.

2.3.3.2 Alternate Waste Rock and Processed Ore Disposal

2.3.3.2.1 Proposed Procedures

1. An estimated 27 million tons of waste rock and 21 million tons of ore would be removed from the mine pits. Waste rock would be deposited in the waste rock piles. Ore that would be crushed and leached would remain at the heap leach pile. The planned distribution of waste rock and heap leach piles is shown in Figure 2.3.

2. Due to the volume of material, the only potential alternative to waste rock and processed ore disposal would be backfilling into the mine pits. Offsite hauling to another location would not reduce or eliminate the environmental impact of waste rock and ore disposal. Two backfilling concepts were considered, complete backfilling and partial backfilling. Complete backfilling was found to be technologically infeasible and impractical as discussed in the following paragraphs. Partial backfilling is evaluated in detail in this document, as further discussed in Section 2.3.4.

2.3.3.2.2 Complete Pit Backfilling

1. As an alternative to permanent surface disposal of waste rock and ore, complete backfilling of the mine pit was evaluated because of potential merits in reducing project impacts to surface drainage, post-mining land use and visual resources. The complete pit backfilling alternative evaluated consists of placing excavated material back into the pit until the approximate premining surface contours in the pit footprint are achieved. Material that would not fit back in the pit (i.e., because of the larger volume in the broken and excavated form) would be left in low piles with gentle slopes.

2. Complete backfilling could allow the drainage path of Redlands Canyon to be substantially restored following cessation of mine reclamation, as opposed to the Proposed Action which would result in the Redlands Canyon drainage terminating in the closed depression until the pit fills with sediment. Long-term visual effects of the project could be reduced because the post reclamation topography would be close to the preexisting condition. Remaining material piles would have gentle slopes so revegetation efforts could occur over the entire alluvial fan portion of the site.

3. Since mining would occur from a single pit, backfilling concurrent with operations is not possible. During project operations, the piles would still be constructed (as they are with permanent surface disposal) and then replaced in the pit at the completion of mining. Waste rock and ore piles would, therefore, be present for the duration of the project. If complete backfilling were used, the procedure would not totally remove the waste rock and heap leach piles because the volume of rock removed from the pit is about 30 percent greater in its broken and unconsolidated form after mining. Complete backfilling would not, therefore, eliminate the impact of aboveground ore and waste rock disposal.

4. The elevation difference between the high and low point of the pit rim is over 1,000 feet. Complete backfilling would require overall backfill surface slopes of up to 1.7H:1V. A backfill slope of this steepness would result in an erosion problem and would be hazardous to construct. As discussed in Section 3.3, surface flow occurs infrequently, but can be large and rapid. The steep backfill surface would erode severely.

5. The effectiveness of complete backfilling in reducing visual impacts would be limited. Short-term visual impacts would not be significantly reduced because the same amount of surface disturbance as for the Proposed Action would still occur. Benefits to reducing visual impacts would primarily be realized over the long term. As the site naturally becomes revegetated comparable to surrounding areas over time, the piles of residual rock that would not fit in the mine pit backfill would become subtle features that would not be readily noticeable. However, it is likely that the backfill of the mine pit would remain a long term scar because the oversteepened nature of the backfill may not allow the surface to stabilize or vegetation to reestablish.

6. Additional important considerations in evaluating the relative merits of backfilling are the conservation of mineral resources and energy. Complete pit backfilling could be in conflict with objectives of federal and state mining statutes, if additional minerals could be extracted

from the pit walls or floor. The SMARA states that "...the reclamation of mined lands ... will permit the continued mining of minerals and will provide for the protection and subsequent beneficial use of the mined and reclaimed land" (Section 2711[b]). The protection of remaining mineralization at a reclaimed mine site is incorporated into federal regulations, such that "Reclamation may not be required where the retention of a stable highwall or other mine workings is needed to preserve evidence of mineralization" (43 CFR 3809.0-5[j]).

7. At the completion of mining, ore will remain within and below the walls and floor of the mine pit to the extent that it cannot be economically recovered due to grades and waste rock removal requirements. While the majority of the known resource is planned to be removed by the proposed pit configuration, improvements in technology and/or substantial differences in market conditions could allow future recovery from remaining mineralization. Backfilling could preclude the potential for such future recovery.

8. Disregarding erosion, technical difficulties and hazards of a steep backfill slope, complete backfilling of the pit would extend the life of the project four to five years of economically unproductive activity, with related impacts of energy use, water use, dust generation and fuel burning emissions that would not otherwise occur.

9. Technical difficulties and other disadvantages of complete pit backfilling for this project make this alternative infeasible. Partial pit backfilling, which is technically feasible, is discussed in Section 2.3.4.5, and examined in detail in Chapter 4.0 of this document.

2.3.3.3 Alternate Gold Extraction Techniques

2.3.3.3.1 Proposed Heap Leach Method

1. The proposed method for recovering gold from the Briggs Project ore is heap leaching, followed by the carbon adsorption process, as described in detail in Section 2.2. This conventional process is widely employed at other commercial gold producing operations with similar low-grade, disseminated ore bodies. For the proposed heap leaching method, the ore would be crushed to reduce the particle size to less than 1/4 inch. From the crushers it will be conveyed onto the heap where dilute cyanide solution will be distributed over the ore. Cyanide solution is collected at the toe of the heap and processed for metal recovery. Once the gold has been extracted from the ore, the ore is rinsed. The rinsed heap would be reclaimed in place.

2. Alternative gold extraction methods could include conventional milling, vat leaching, and in situ leaching.

2.3.3.3.2 Conventional Milling

1. Conventional milling generally consists of reducing the ore particles to a very small size (e.g., usually very fine sand and silt size particles) that liberates minute gold particles and maximizes the exposed mineral surface area, and then extracting the gold from a slurry of the finely ground particles mixed with water and chemical reagents in large tanks.

2. Two basic methods of gold recovery can be used to extract gold from the slurry:
   - The floatation method utilizes surfactant reagents that form a froth to which the gold and/or gold bearing sulfide particles attach. This method is generally suited for some ores that contain appreciable quantities of sulfide minerals. It would not be appropriate for the Briggs Project ore.
   - Leaching methods utilize cyanide to dissolve gold from the slurry and activated carbon to extract the dissolved gold from solution.

3. Due to the need for substantial grinding facilities, the conventional milling process requires considerably greater energy than the heap leach process with associated impacts of increased fuel consumption and related air emissions. Also, the process produces wet tailings that would require a suitable tailings containment facilities.

4. The proposed heap leach processing method also has advantages pertaining to aspects of reclamation and minimization of surface disturbance. For the milling alternative, tailings would be slurried into an impoundment and water would be decanted from the tailings for reuse in the process. Upon abandonment, the surface of the tailings would be dried and revegetated. The abandoned tailings disposal facility would appear much like the abandoned heap, but top surface would consist of very fine particles that could be susceptible to erosion. The volume of the impoundment would be comparable to the required size of the heap leach piles, although more surface disturbance would be required because the tailings impoundment could not practically be constructed as high as the heap leach piles. A preliminary design for a tailings disposal impoundment indicates that up to about 270 acres could be required (Canyon, 1993a) compared to the 138 acre size of the proposed heap leach pile.

5. Size reduction of run-of-mine ore is the largest single power consuming item of the proposed project. The milling alternative would increase power consumption by about 200 percent

(Canyon, 1993a), with corresponding increases in fuel consumption for the onsite electrical generators and related fuel burning emissions.

6. The conventional milling alternative has no environmental advantage over the proposed heap leach process that would compensate for the disadvantages discussed above.

2.3.3.3.3 Vat Leaching

1. The vat leaching process is somewhat similar to heap leaching, but is conducted in large, shallow tanks. When the ore in the vat has been leached, it is rinsed and then disposed, and the vat is reloaded. It is an appropriate technique to employ with ores having rapid gold dissolution rates and/or for sites with insurmountable constraints that prohibit leach pads (e.g., high steep topography). Typically, the gold from such ores would be extracted within days or weeks compared to heap leach extraction which can occur over a period of months to years. The same amount of leached ore residue is produced as in heap leaching. However, double-handling of material is required with associated increases in fuel consumption and associated fuel-burning emissions.

2. This alternative does not have environmental advantages over the proposed method and is not suited for the Briggs deposit.

2.3.3.3.4 In Situ Leaching

1. In situ leaching involves the injection of leaching solution directly into an ore body while it is still in place in the ground, and then recovering the solution with the dissolved ore mineral by pumping from extraction wells. The method requires suitable geologic formations that would confine the solution in the ground until it could be recovered. In the absence of such formations, the potential for adverse effects to ground water and soils could be substantial. In situ leaching is typically used for minerals such as salt, borates, copper, uranium and other minerals that are readily dissolved by water or acid solutions as opposed to cyanide leaching solutions typically used to dissolve gold.

2. While this alternative would not involve open pit mining methods with associated ore and waste rock removal, the risk of solution escape and ground water and soil contamination would preclude its use for the Briggs gold deposit.

2.3.3.4 Alternative Project Location and Configurations

1. Locations of project facilities for the proposed mine is largely constrained due to: (1) the fixed location of the ore body; (2) the WSAs (discussed in Section 3.7) that bound the project site on all sides; and (3) traces of the Panamint Valley Fault Zone that traverses the site from east to west and that is believed to be "active" (movement within the last 10,000 years) as discussed further in Section 3.2. The proposed project layout has been designed to minimize the area to be disturbed and potential energy consumption and maximize project efficiency considering the given constraints.

2. Canyon controls mining claims on all lands contiguous to the project and over much of the western slope of the Panamint Range. Therefore, limitations to feasible project configurations would be substantially reduced if Congress acts to pass the DPA in a form that eliminates the WSA status of lands surrounding the project. Because it is anticipated that such legislation might be passed at some time in the near future, this document considers alternatives that could only be implemented if the WSA contiguous to the site is opened to mineral development.

3. The facilities and structures proposed for use at the project site are limited to those necessary for efficient operation. Options for relocation of the primary project facilities that were considered but found not to be acceptable are described in the following sections. Additional project configuration alternatives that are considered viable options to the Proposed Action are discussed in Section 2.3.4.

2.3.3.4.1 Mine Pit

1. The gold ore body location is fixed. Consequently, there are no geographical location options for the mine pit. This means that an alternate site location for the Briggs Project is not a viable alternative.

2.3.3.4.2 Offsite Ore Processing

1. The Proposed Action includes onsite location of all facilities required for self-sufficient ore mining and processing including the mine pit, waste rock piles, heap leach piles, process water ponds, gold recovery facilities, maintenance and administration facilities, etc., as described in Section 2.2.

2. The offsite ore processing alternative would consist of extracting ore at the proposed mine site and trucking the ore to a new or existing ore processing facility at an offsite location. For this alternative, the Briggs Project site would include the mine pit and waste rock piles, an ore stockpile, and ancillary maintenance, administration and truck loading facilities. There would be no heap leach pile, process water ponds, or gold recovery facilities.

3. Under current conditions, construction of new facilities for processing ore offsite would have to occur outside of the adjacent WSA and there are no existing facilities in the vicinity that might be capable of processing the ore under contract. Furthermore, trucking of ore offsite would require up to about 1,000 one way trips per day (based on 30-ton truck and trailer rigs hauling on a five day per week schedule). The existing dirt road to the site would need to be upgraded and widened, infringing on the WSAs that border the road on both sides. Environmental impacts of this alternative would be substantially greater than for the Proposed Action due to increased fuel consumption, increased dust and emissions from truck haulage, and traffic related impacts.

4. If Congress were to act on the DPA eliminating the WSA status of lands surrounding the project, a processing facility could be constructed close to the current project site. However, there are no alternative sites nearby that would offer known substantive environmental advantages and there would still be increased impacts of fuel consumption and dust and fuel burning emissions.

5. Based on these considerations, offsite processing is not a viable alternative.

2.3.3.4.3 Heap Leach Pad Alternatives

1. The Proposed Action is designed to treat ore from the pit on a single-use heap leach pad located near the ore body. Estimates currently show about 21 million tons of mineable ore. The current proposed pad configuration would allow for the treating of 26 million tons of ore on the leach pad assuming a density of about 110 pounds per cubic foot. This is an excess of 25 percent over known reserves. The excess heap leach capacity is appropriate for purposes of environmental analysis to assure that project impacts are adequately assessed considering a reasonable range of operational conditions that may occur (e.g., real-time ore leachability could dictate modification of the pad height or some rock currently defined as waste may be found to be mineralized).

2. The proposed location of the heap leach pad was determined after consideration of operational and environmental factors. These include proximity of the mine pit, efficiency of construction and operation, minimizing land use, and avoiding active faults that traverse the site.

3. Alternative heap leach pad locations evaluated are shown in Figure 2.24. All of the alternatives examined are similar in the following traits:
   - Ore capacity, area of disturbance and height above natural terrain.
   - Geotechnical stability and operational feasibility.

4. The primary considerations examined in evaluating alternative leach pad locations are: (1) degree of disruption to the natural drainage pattern of the alluvial fan on which the pad would be constructed; and (2) haul distance from the mine pit. These considerations were evaluated because haul distance directly affects air emissions and fuel consumption, and disruption of drainage on the fan surface affects downgradient water flow patterns and vegetation. The unobstructed fan surface has a circular arc of about 115 degrees. Fan obstruction is measured as a percentage of that arc over which the pad would obstruct flow of surface waters.

Proposed Configuration

1. The proposed leach pad configuration is located immediately below the pit. This alternative minimizes the distance ore must be moved from the pit to the pad while allowing the pad to be developed in a regular shape that allows efficient construction, operation and land use. (Small or odd-shaped pads are less efficient to construct because they hold less ore per square unit of disturbance.) It is located entirely within the project site and does not infringe on the WSA. It would obstruct surface flow over about 66 percent of the breadth of the alluvial fan. However, disturbance to the current flow path of the Redlands Canyon drainage is minimal (see Section 2.2.2.5.3).

North Pad Location

1. This alternative location would shift the leach pad about 1,600 feet to the north and would require transporting the ore an average of 500 feet further from the pit as compared to the proposed pad location. It reduces exposure to the Redlands Canyon drainage by being located on the north side of the fan (the current drainage path is to the southwest), but does not eliminate it entirely as it does obstruct about 28 percent of the fan breadth. It would obstruct

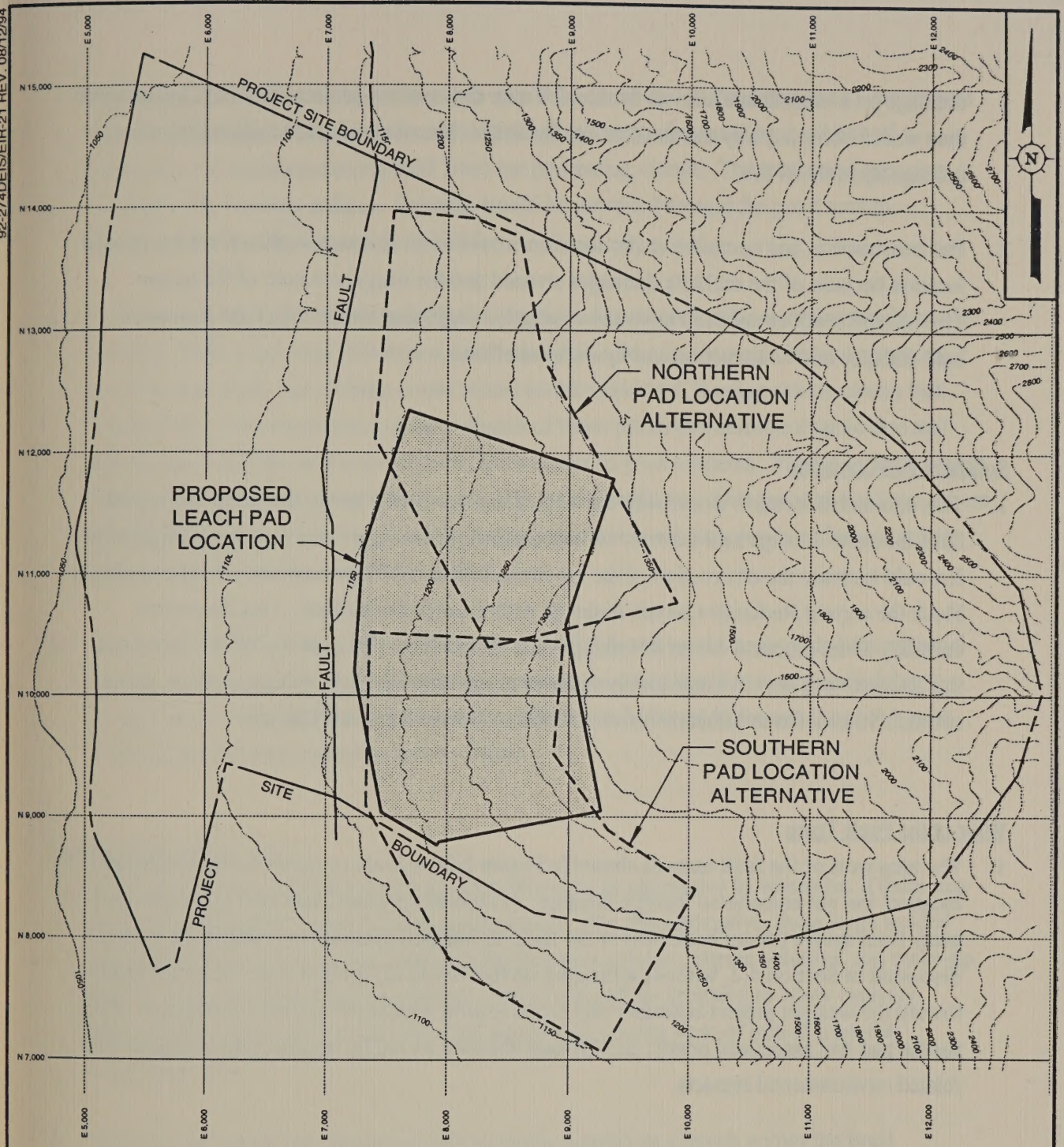


FIGURE 2.24

ALTERNATIVE LEACH PAD LOCATIONS

BRIGGS PROJECT

REFERENCE: CANYON, 1993a.

ENVIRONMENTAL SOLUTIONS, INC.

drainage on a subordinate alluvial fan located near the northern project boundary, but no more than would occur anyway due to other site facilities. The northern pad location does not infringe upon the WSA.

2. Pad construction and operation at this location would be more complex than for the proposed location because of the multiple drainages crossed and the irregular nature of the terrain. This alternative does not offer environmental advantages that would offset the increased haul distance and construction and operational efforts.

Southern Pad Location

1. This alternative location would shift the leach pad about 1,800 feet to the south and would have the same average haul distance and operational efficiency as the proposed configuration. It would increase the obstruction of the fan breadth to about 77 percent and would completely block the current Redlands Canyon drainage path over the fan surface. This alternative currently is not practical due to its infringement on the WSA. Even if the WSA is removed, this alternative is not environmentally superior to the Proposed Action because there are no substantive benefits to offset the increased obstruction of Redlands Canyon.

West of the Fault Trace

1. The area west of the fault trace as shown in Figure 2.24 was also considered for leach pad location, but not considered feasible because: (1) there is not sufficient area to locate a pad away from splays (minor branches) of the fault, as mapped pursuant to detailed site studies discussed in Section 4.2, without infringing on the WSA; (2) ground water becomes shallow toward the western project boundary and could require special design and construction effort for the pad and associated ponds; and (3) haul distance would be significantly increased with related environmental impacts.

2.3.3.4.4 Alternative Solution Storage Configuration

Proposed Configuration

1. The proposed configuration for storage of process waters for leach pad operation consists of a series of ponds lined with double-FMLs as discussed in Section 2.2.2.3.3. Pregnant and barren solution ponds would be contiguous with the emergency stormwater containment pond as shown in Figures 2.6 and 2.7. Separate make-up water and detoxification ponds would

also be provided. These additional ponds would be connected to the emergency containment pond via lined ditches so the entire capacity of all of the ponds would be available, if necessary, for containment of runoff from the processing circuit. The total pond capacity would be 24.5 million gallons. Fencing would be provided around the pond area to discourage access by terrestrial wildlife.

2. For normal operating conditions, only the pregnant, barren and make-up water ponds would be used. Following large rainstorms, there would also be process water in the emergency containment pond. All of these ponds would be provided with floating plastic covers that would fully cover the solution surface of each of these ponds to minimize evaporation and attraction of wildlife, and to preclude wildlife access to pond contents. Floating plastic covers are a proven technology currently in use in the mining industry. This practice has been shown to effectively protect wildlife from exposure to processing solution ponds as long as covers are adequately maintained (BLM, 1994).

3. The detoxification pond would normally be dry. This pond would be provided for potential use to destroy cyanide in the processing solution in the event that it is ever required due to system upset. This pond would be netted so that it would be ready for use if needed, with minimal potential for access by avian wildlife.

Solution Storage in Tanks

1. Storage of process waters in tanks was considered as an alternative to determine if there may be environmental advantages to this configuration. For this alternative, three large welded steel tanks would be provided, one each for pregnant solution, barren solution, and make-up water. A double-FML lined emergency pond would still be provided to allow capacity for potential stormwater runoff and to accommodate gravity flow of runoff from the heap leach pad.

2. The pregnant and barren solution tanks would be located on a bench within the lined emergency containment pond to provide secondary containment for the tanks. The make-up water tank would be located adjacent to the emergency containment pond. A separate detoxification pond for potential use to destroy cyanide in the event of system upset would also be provided. As for the Proposed Action, process water storage would occur adjacent to the northwest corner of the leach pad.

3. The primary factors prompting the consideration of process water storage in tanks were to determine if this alternative could substantially increase wildlife protection or reduce water evaporation losses. The fully covered ponds included in the design for the Proposed Action would effectively mitigate the potential for evaporation from the ponds and the potential for wildlife exposure. Storage of process waters in tanks would not be expected to materially increase the level of mitigation of these potential impacts.

4. Use of large tanks for storage of process water would increase visual impacts of the project for the six-year operational period. The tanks would be painted with a non-reflective earthtone color, but would still be visible due to their size and location. Use of tanks could also introduce substantial operational complications, since tanks could not be practically constructed to provide as much capacity as the proposed pond configurations. This would limit the normal water volume surge capacity of the processing system, resulting in unnecessarily small tolerances in water application and management on the leach pad. Frequent use of the emergency containment pond could be expected.

5. Because of increased visual impacts and operational difficulties, without apparent environmental advantages, the alternative solution storage configuration was eliminated from detailed consideration as an alternative to the Proposed Action.

2.3.3.5 Alternative Power Supply

1. Peak energy requirements for electrical power to serve the proposed project would be approximately 3,300 kw. Of this, 3,000 kw would represent a relatively steady load. The other 300 kw would be required to meet transient electrical demands of the crushing unit. If the electrical system is unable to adequately respond to these large instantaneous load fluctuations, equipment will trip off-line, and the electrical system will fail. The problem of this fluctuating load can be dealt with if a sufficient supply of power is made available, such as from a public utility, or by installing onsite generation equipment with a rapid response time to fluctuating load conditions.

2. Based upon these peak energy and steady load considerations, the following alternatives were considered for power supply to the proposed project:
   - Onsite power generation
   - Utility power from Southern California Edison (SCE)

Onsite power generation was evaluated based on generators powered by diesel fuel, propane and natural gas.

3. The purpose of evaluating power generation alternatives was to determine if project air emissions could be substantially reduced. The primary emissions of interest are NO_x and PM_{10}. As discussed in Section 4.6, PM_{10} emissions could at times locally exceed the California 24-hour PM_{10} standard and NO_x emissions would be close to the California one-hour standard.

2.3.3.5.1 Proposed Onsite Generation

1. The power generators will consist of four identical units, three of which will typically operate at any one time with one on standby or to supply additional power for peak load periods. The units will each comprise a 1,600 horsepower engine driving a 60 Hz prime power generator set rated at 1,100 kw continuous duty. The generators will be located near the crusher plant (the largest electrical load) to minimize power distribution costs. With four generators available, electrical reliability should approach 100 percent for critical items such as pumps.

2. Low sulfur diesel fuel would be used for power generation and other site needs. Power generation would consume an estimated ~~3.2~~ 1.7 million gallons of diesel fuel per year (Canyon, 1994a).

2.3.3.5.2 Southern California Edison Connection

1. The closest known power lines that may be capable of satisfying site power requirement are operated by SCE and located in Trona (Figure 1.1). A small existing overhead line extends from Trona to bring power to a Federal Aviation Administration (FAA) radar station located on Ballarat Road. SCE has indicated that this line would require reconstruction in order to provide adequate power to the Briggs Project site. Upgrading of facilities upstream from Trona might also be necessary.

2. The line reconstruction that would be required to bring adequate power to the site would include replacing the conductor wire and installing new power poles over about 18 miles of the existing power line to the radar station. New or upgraded substations and circuiting equipment (e.g., to protect against interference from the site area) would also be required.

From the vicinity of the radar station, about eight miles of new power line construction would have to occur.

3. Several miles of the line construction activities would occur within WSA and within habitat of the Mohave ground squirrel, a state-listed threatened species, and the desert tortoise, a state and federally listed threatened species. Line construction would result in surface disturbance along the line route, and the new portion of the line would add to visual disturbances of the Briggs Project.

4. Additional surface disturbance that would be required, including extensive disturbance of endangered species habitat and WSA, and increased visual impacts would offset environmental benefits of reduced emissions. Because of these impacts, extension of a power line from offsite is not environmentally superior as compared to onsite power generation included as part of the Proposed Action.

2.3.3.5.3 Alternative Fuels

1. In addition to the proposed use of low sulfur diesel fuel for power generation, use of natural gas- and propane-fired engines for powering generators was considered.

2. Extension of an existing natural gas line from Trona was considered but determined not to be feasible for the same reasons extension of a power line is not feasible. Surface disturbance for a pipeline would be even greater than for a power line because the pipeline would have to be buried in a trench. The pipeline route would have to traverse Mohave ground squirrel and desert tortoise habitat and WSA. Due to the sensitive nature of these areas, extension of a pipeline is not considered to be feasible. Furthermore, as discussed in the following paragraphs, natural gas is not likely to significantly reduce NO_x or PM_{10} emissions.

3. Evaluation of emissions that would be expected using alternative fuels was conducted to determine whether trucking of natural gas or propane onto the site should be considered. Use of propane or natural gas as an alternative fuel, because of its lower energy content, would require an approximately 50 percent greater volume of fuel to deliver the same amount of energy as a particular volume of diesel. This would result in approximately ~~three~~ two more fuel trucks arriving at the site per week. Additional fuel storage capacity (extra tanks) would also be required. For the alternative fuels, storage tanks would be pressurized.

4. NO_x emissions would not be substantially reduced by use of natural gas or propane (AWMA, 1992). PM_{10} emissions from the generators could be reduced about 30 percent (AWMA, 1992), but the amount of reduction of overall project PM_{10} emissions would be negligible (i.e., the reduction would be about 1 percent) because the generators would be a small contributor to project PM_{10} emissions. The primary benefit of the alternative fuels would be that emissions of CO and SO_2 could be reduced. The CO and SO_2 emissions for the Proposed Action would be only about 1 and 2 percent of applicable air quality standards and, therefore, are not of concern.

5. The minor benefits of reduced emissions would not result in substantial benefits to air quality that would offset disadvantages of the alternative fuels. The disadvantages include increased fuel delivery trips, increased storage volume requirements, and increased safety considerations of the pressurized fuel storage tanks.

2.3.3.6 Alternatives to Clay Borrow From the Playa

1. The COE requires that the overall and basic purpose be specifically defined for any activity requiring an individual Section 404 permit. The basic purpose of borrowing clay from the playa surface would be to provide material for construction of a liner for the heap leach pad. The COE does not consider this to be water dependent for purposes of project review pursuant to Section 404(b)(1) guidelines. The overall purpose of borrowing clay from the playa would be to provide liner material for the heap leach pad for the Briggs Project. Liner material must meet state mandated requirements and be obtainable within a reasonable proximity of the project site.

2. Alternatives to the Proposed Action that were considered to fulfill the overall purpose include:
   - Importing clay for liner construction from an offsite source other than the playa.
   - Obtaining clay from the playa at a location that is different from the potential locations proposed.
   - Obtaining clay from the playa using a borrow excavation configured differently than proposed.

   The purpose of evaluating these alternatives was to determine: (1) if suitable borrow material could be obtained while avoiding disturbance to waters of the United States (i.e., the playa); (2) if waters of the United States could be avoided by an environmentally preferable alternative; and (3) if borrow from the playa could occur in a manner that would result in less impact than the configuration proposed.

2.3.3.6.1 Proposed Clay Borrow From the Playa

1. Construction of the leach pad and associated process water ponds using composite liners as discussed in Section 2.2.2.3.1 would require up to about 300,000 cubic yards of clay. The Proposed Action includes the potential to obtain this clay material from one of two locations on the playa that are shown in Figure 2.20. Both locations, and the majority of the Panamint Valley, are public lands managed by BLM. The south borrow area is located within the Slate Range WSA. BLM currently will not allow excavation within the WSA. This location is included as a possible clay borrow site because it is proximal to the Briggs Project and because the DPA legislation currently pending in Congress proposes to remove the WSA status of this area and open it to multiple use management by BLM, making it available for mineral extraction. The north borrow area is included as a possible borrow site because it is the closest area of the playa that is currently open for mineral extraction and, therefore, available for use in the event that congressional action on the DPA is not forthcoming. Both the north and south borrow sites are known to have an unlimited quantity of clay that would satisfy specifications for liner material. Both of the potential playa borrow areas are below the ordinary high water mark and, therefore, are regulated as waters of the United States under jurisdiction of the COE.

2. If one of the two potential borrow locations on the playa is used, excavation would occur over an area of up to 47 acres and to a depth of about 4 feet. Excavation would occur when the natural playa surface in the vicinity is dry to minimize the potential impacts to wildlife. Reclamation of the borrow excavation would include leaving the side slopes at shallow angles (e.g., 5H:1V) and constructing an approximately 1-foot high clay berm around the edge of the excavation to prevent the excavation area from draining water from the surrounding natural playa surface.

3. The Proposed Action also includes the potential to obtain clay borrow from an onsite borrow area that is upland from the ordinary high water mark and, therefore, outside waters of the United States and COE jurisdiction. Testing of material from this site is ongoing. However, results to date indicate that the onsite borrow area either by itself, or with a reasonable amount of admixing (e.g., with commercial grade bentonite) would not be able to consistently provide material capable of satisfying the required specifications discussed in Section 2.2.2.5.6.

4. The Proposed Action also includes the potential to construct the leach pad liner using a double FML configuration instead of a composite FML/clay configuration if adequate quantities of clay required for the composite liner cannot be practically obtained. This double liner

configuration would reduce the amount of borrow required to about 150,000 cubic yards and would make the material specifications for the borrow less stringent. For the double FML configuration, the borrow material would primarily be used to prepare a smooth liner subgrade to minimize the potential for sharp protrusions on the subgrade surface that could damage the lower FML. For this use, low permeability material is desirable for environmental protection, but strict adherence to the $1x10^{-6}$ cm/sec permeability specification discussed in Section 2.2.2.5.6 is not required.

5. Chapter 4.0 discloses the maximum reasonably foreseeable impacts that could occur due to the Proposed Action under any of these potential borrow and liner construction configurations. Of these potential configurations included as part of the Proposed Action, there are no significant differences in environmental impacts. The few material differences in impacts that would occur are discussed in Chapter 4.0.

2.3.3.6.2 Import Clay From an Offsite Source Other Than the Playa

1. In searching for a source to satisfy the project's clay borrow requirement, the following criteria were applied: (1) the source must be within a reasonable proximity to the project site; (2) the source must be capable of providing at least a large portion of the quantity of material required; and (3) the material must meet the technical quality specifications for liner construction.

2. The Briggs Project site is located in a remote area of eastern California. There are no known commercial sources of clay in the region that could practicably provide material for liner construction. Potential sources are limited to natural deposits open to mineral extraction.

3. From a regional viewpoint, the vicinity of the Briggs Project has a relatively limited amount of area available for mineral extraction. DVNM occupies over 3,000 square miles to the north and east of the project site. Military lands occupy over 2,500 square miles to the south and west of the project site. Much of the area lying between these limited use areas and the project is WSA or proposed wilderness.

4. The geology of areas that are available for mineral extraction in the project vicinity, and areas that may become available for mineral extraction upon passage of the DPA, was reviewed to determine the potential for occurrence of clay deposits. Based on these evaluations, potential sources of clay identified include the unconsolidated deposits in the lower portions of

Panamint Valley, the playa in Searles Valley (about 35 road miles to the southwest), Saline Valley (about 90 road miles to the north), and Owens Lake (about 70 road miles to the northeast). Borrow of clay from Searles Valley, Saline Valley or Owens Lake was not considered in detail because of distance from the site and the no apparent reduction in environmental impacts as compared to the proposed locations.

5. Obtaining clay from fault zones within the mine pit area was also considered. Geologic logging conducted by Canyon as part of exploration activities indicates that clayey material occurs along some of the faults in the area that would be excavated for the mine pit. Potential use of this material for clay borrow was evaluated because this material would be excavated for the Proposed Action anyway and, if it could supply material for liner construction, additional surface disturbance for clay borrow could be reduced or eliminated. The zones of clayey material within the mine pit are located well below the starting point for pit excavation so this source would not be available for initial project construction. In addition, Canyon's efforts to define the quantity of clay material present have been inconclusive due to the geology of the deposit and limitations of drilling equipment. There is not adequate assurance that a sufficient quantity of material meeting required specifications is available. Finally, because of the character of the clay material following fault planes and occurring in relatively narrow and isolated zones, the quality of material obtained may be difficult to control. Because maintaining tight technical specifications is critical to constructing an effective liner system, the unknown aspects of the clay material within the pit and potential quality control difficulties do not allow this to be considered a reliable borrow source alternative. It could be used for later phases of pad construction if found to consistently satisfy technical specifications as the material is exposed by the mine pit excavation.

6. The unconsolidated sediments on the floor of Panamint Valley have been naturally sorted by surface water runoff from the adjacent uplands. The sediments are very coarse at the top of the alluvial fans and become finer with distance down the fans, until the playa area where sediments are primarily clay. This natural sorting phenomenon was considered in evaluation of potential alternative clay borrow areas. The lower portions of alluvial fans were sampled and tested to determine if acceptable material could be obtained outside of the playa.

7. The potential onsite borrow area is located at the lower end of the alluvial fan that emanates from Redlands Canyon, and is generally representative of the type of material that occurs just outside the playa margin. Other locations just outside the playa margin were evaluated by Canyon and found not to provide material substantially more suitable for liner construction

than the potential onsite borrow location. In some areas along the eastern margin of the valley ancient lakebed deposits have been uplifted by faulting along the valley margins. These deposits are now exposed well above the playa. Samples representative of the lakebed deposits were obtained and tested by Canyon and found not to provide the consistent low permeability required for construction a composite liner.

8. Based on the land use access limitations in the area, and geologic studies and ground reconnaissance conducted for those areas that are (or may soon become) open for mineral access, the Panamint Valley playa is the only source for clay borrow in the vicinity where it is known that the quantity and quality of material required for construction of a composite liner can be obtained.

9. If the double FML liner configuration is used for the leach pad, fine grained borrow would still be required to provide a smooth compacted surface for liner bedding, but there would be no regulatory requirement for permeability specifications. While this would increase the potential for a location upland from the playa to be capable of providing acceptable borrow material, the use of the low permeability clay from the unvegetated playa surface would still be environmentally preferable as compared to using soil from an upland location. Reasons why one of the potential playa borrow locations proposed would be environmentally preferable include:

   - Use of the low permeability clay from the playa for liner construction would provide greater protection against potential seepage through the liner than soils from upland areas that would have higher permeability.
   - The uniform fine grain characteristic of the clay from the playa would maximize the level of quality control achievable for liner construction and minimize the potential for small rock particles to protrude from the liner subgrade that may be capable of causing small holes in the FML.
   - Borrow from the unvegetated playa surface, as discussed in Chapter 4.0, would result in minimal impact to wildlife, and little or no impact to vegetation (up to about one-third of an acre of vegetation disturbance could occur for access). Borrow from an upland site would disturb about 47 acres of vegetation and wildlife habitat.
   - Borrow from the playa, as discussed in Chapter 4.0, would result in minimal visual impact. Following the first wet cycle, a borrow excavation on the unvegetated playa surface would not be readily noticeable except for the shallow topographic depression. The approximately 47 acre surface and vegetation disturbance that would occur with borrow from an upland site would be readily visible until substantial revegetation occurs.

2.3.3.6.3 Obtain Clay From an Alternate Playa Location

1. Alternative sites for borrowing clay from the playa were evaluated to determine if use of an alternate location could reduce environmental impacts or impacts to waters of the United States. There are large areas of the playa with land access conditions and material characteristics similar to the potential north and south borrow areas, so these borrow locations could easily be moved to another location on the playa. Assessment of alternative locations on the playa considered the environmental setting of the playa in two categories: (1) the area above the ordinary high water mark; and (2) the area of unvegetated playa surface below the ordinary high water mark.

2. The areas of the playa where potential borrow is proposed are located below the ordinary high water mark, but are normally dry and are barren of vegetation. These barren portions of the playa normally provide little or no ecological function (e.g., fish or wildlife habitat value, control of water or sediment distribution patterns, water quality influence, etc.). The primary impacts identified that could result from potential disturbance of the playa surface, as proposed, include minor effects to waterfowl and shorebirds that use the playa on infrequent occasions when water is present, and the potential to affect brine shrimp eggs that may occur in the dry playa soils. These impacts are discussed in Chapter 4.0. The purpose of considering borrow from the playa fringe above the high water mark was to determine if these impacts could be reduced or eliminated without increasing overall impacts to environmental resources.

3. Existing vegetation is discussed in detail in Section 3.4. Above the ordinary high water mark, the playa margin is sparsely vegetated with plants of the desert sink vegetation community. If a location above the ordinary high water mark is used, up to 47 acres of the desert sink vegetation community would be impacted. This compares to about one-third acre of disturbance to vegetation that would occur if the south borrow area is used and virtually no disturbance to vegetation if the north borrow area is used. Moving the potential playa borrow locations to above the ordinary high water mark would reduce the potential to impact dormant brine shrimp eggs that may occur in the playa soils. It may also slightly reduce the potential for impacts to shore birds or waterfowl that may use the area on infrequent occasions when standing water occurs in the vicinity of the proposed borrow locations, but whether or not there would actually be a net reduction in the impact to these birds cannot be projected because of the interrelation of the increased vegetation impact with habitat. The increased disturbance to vegetation that would occur if a location above the ordinary high water mark were used would also increase visual impacts of the potential borrow from the playa. Because of the

increased impacts to vegetation and visual resources, borrow from the playa margin above the ordinary high water mark would not be considered to have a less adverse impact than the proposed locations. In addition, because of the natural sorting processes of surface water runoff, soils below the ordinary high mark would provide better clay for liner construction than soils above the high water mark. Use of the higher quality clay would increase the level of protection against potential solution loss and release of processing reagents to the environment.

4. The potential south borrow area is located below the ordinary high water mark of the playa proximal to the leach pad where the material would be used. The proximal location would minimize hauling distance, fuel consumption, and haul road and fuel burning emissions. It is also located where the band of vegetation at the margin of the playa is narrower than the average for the site area, so the impact to vegetation due to required access to the borrow excavation would be minimal (about one-third acre). There are no springs near the borrow location (as there are at the toe of some other alluvial fans in the valley) or other unique resources that would be impacted by surface disturbances. The south borrow area excavation would be located to avoid a thin band of the playa perimeter that is considered wetland by the COE (see Section 3.4.2.4 for further discussion). Borrowing clay from a location below the ordinary high water mark of the playa more distal from the project site would increase impacts of fuel consumption and fuel burning and dust emissions, without apparent environmental benefits to offset these increased impacts.

5. If the DPA is not passed, the area of the playa available for mineral extraction would be limited to the portion north of Ballarat Road. The north borrow area has been identified as the most proximal available location of the unvegetated playa surface if the DPA is not passed. The north borrow area is located adjacent to Ballarat Road so that there would be no additional disturbance required for access. There are no springs or other unique environmental resources nearby. There are no locations on the playa that would be available for mineral extraction without passage of the DPA that could materially reduce impacts as compared to the north borrow site. Moving the location more distal from the project site would increase fuel consumption and air quality impacts of haul road dust and fuel burning emissions.

2.3.3.6.4 Alternative Borrow Excavation Configurations

1. Different configurations for the borrow excavations were also evaluated to determine if potential impacts could be materially reduced. Alternative excavation configurations included: (1) a shallower excavation over a large area; and (2) a deeper excavation over a smaller area.

2. If the depth of the borrow excavation were decreased to about 1 foot instead of 4 feet, the area of the excavation would be increased to about 190 acres. The increased surface disturbance would result in a proportional increase in the potential for short-term impacts to birds that use the playa when water is present and brine shrimp that may occur in playa waters or as dormant eggs in the playa soils when the playa is dry. However, the impacts would not be significant and would be expected to be shorter in duration than for the proposed configuration because the depth of the disturbance would be less and the playa surface would be naturally restored to near existing conditions over a shorter period of time. Visual impacts of the excavation would also be increased until a wet cycle occurs, after which the shallow depression may be less noticeable than for the proposed configuration. The reduced duration of impacts would be offset by the increased disturbance so there would be no significant benefit of this configuration over that of the Proposed Action.

3. If the depth of the borrow excavation were increased to about 8 feet instead of 4 feet, the area of the excavation would be decreased to about 25 acres. The decreased surface disturbance would result in a proportional decrease in the potential for short-term impacts to wildlife that utilize the playa when water is present. However, the decrease in impacts would not be significant and some impacts that would occur may be longer in duration than for the proposed configuration, because the depth of the disturbance would be greater and natural restoration of the playa surface would require a longer period of time. There would also be a greater potential to encounter shallow ground water which could result in the excavation containing surface water on a perennial basis. Overall, the smaller and deeper excavation would not result in a significant reduction in impacts as compared to the Proposed Action.

2.3.4 ALTERNATIVES TO THE PROPOSED ACTION

1. This section outlines alternatives to the Proposed Action that are considered in detail in Chapter 4.0 of this document. These alternatives include:

   - Alternative ore beneficiation rates (faster and slower)
   - Reduced project size
   - Balanced waste rock dumps
   - Partial backfilling

   In addition, the No Action Alternative is also described.

2.3.4.1 No Action Alternative

1. Implementation of the No Action Alternative would mean that the Briggs Project would not be developed. Canyon's exploration disturbances at the site would be reclaimed and no potential for increased environmental impacts due to the Proposed Action would occur. Surface disturbances that have been created by historic non-project related mining events would remain, and the present land uses would continue. The site would be available for future commercial gold processing proposals or for other proposals as permitted by BLM policy and County land use designations.

2. Federal mining laws encourage mineral development provided that such development occurs in a manner that does not result in "unnecessary or undue degradation" of federal lands. The No Action Alternative would be generally inconsistent with federal and state policies encouraging mineral development if mining is proposed to be conducted in an environmentally responsible manner.

3. The SMARA also encourages the production of minerals while giving consideration to environmental resources. However, the County could adopt the No Action Alternative if significant adverse environmental effects identified in Chapter 4.0 of this document could not be mitigated to a level of less than significant, and a Statement of Overriding Considerations under CEQA could not be justified.

2.3.4.2 Alternative Ore Beneficiation Rates

1. This section provides two alternative projects based upon decreasing or increasing the planned ore beneficiation rate from the current proposal of up to about 4 million tons per year, resulting in either a slower or faster project operating rate. These alternatives provide a basis for comparing the environmental impacts that could result from a change in project duration.

2. For purposes of analysis, the following assumptions are made regarding processing rates for the two alternatives:

   - **Slower Beneficiation Alternative** - Total ore and overburden tons would be the same as estimated for the Proposed Action, but the ore processing rate would be decreased by 50 percent (i.e., a processing rate of about 2 million tons per year), thereby increasing the operational

period of the project to about ten years (21 million tons of ore processed at about 2 million tons per year). Reclamation would be the same as for the Proposed Action.

- **Faster Beneficiation Alternative** - Total ore and overburden tons would be the same as estimated for the Proposed Action, but the ore processing rate would be increased by 50 percent (i.e., a processing rate of about 6 million tons per year), thereby decreasing the operational period of the project to about four years.

3. Onsite land disturbance and the site layout for these alternatives would be the same as for the Proposed Action (see Figure 2.3). Excavation of the same total tonnage of ore and waste rock, but over a different length of time, would still require the same mine pit, waste rock and heap leach pile configurations. Because the process water ponds are sized based on the ultimate pad area and storm capacity, in contrast to solution application rate, there would be no change to the size of the ponds. Similarly, other disturbances related to the leach pad, such as the borrow area, piping ditch, and diversion channels, would be the same. Disturbances for onsite roads and ancillary facilities would be similar because the same basic transportation and access needs and supporting activities would occur. While individual buildings or pieces of equipment may be slightly larger or smaller, for example, a slightly larger or smaller crusher circuit might be used, or a few offices might be added or dropped, differences in disturbances would be negligible. Therefore, the changes in environmental impact that could occur due to an increased or decreased processing rate are primarily related to the duration of activities and consumptive uses associated with project operation. These issues are specifically addressed for each alternative in appropriate sections of Chapter 4.0.

4. The alternative ore beneficiation rate alternatives would not include the offsite mitigation measures discussed in Section 2.2.4 that were volunteered by Canyon as an integral part of the Proposed Action.

2.3.4.3 Reduced Project Size

1. This alternative provides a basis for comparing the potential environmental impacts that could result from a change in project size as compared to the Proposed Action. As proposed, the mine pit is designed based on engineering and economic parameters to optimize the percentage of the resource extracted. The planned configuration would allow approximately 85 percent of the known resource to be recovered.

2. The geometry of the ore body relative to the ground surface results in the pit configuration being relatively insensitive to normal gold price fluctuations and ore/waste rock ratios. Arbitrary changes to the pit size, therefore, would not provide for the project to most efficiently recover the mineral resource. Furthermore, a substantially reduced project size may make the project not viable and, in effect, be the same as the No Action Alternative.

3. For purposes of analysis, this alternative considers the total tons of ore and waste rock to be mined to be reduced by 30 percent. This would result in approximately 15 million tons of ore and 19 million tons of waste rock being mined. The rate of mining and beneficiation would be the same as for the Proposed Action.

4. Changes in the potential environmental impacts of site activities from this alternative would be primarily related to the reduced mine life and the change in area of disturbance. Decreasing the tonnage of ore and waste rock to be excavated by 30 percent would not result in a comparable reduction in surface disturbance, because the waste rock piles and heap leach pile generally become less efficient (i.e., with respect to volume per acre of disturbance) with decreasing size, and because many ancillary disturbances such as roads, buildings, water supply equipment, site drainage controls, etc., would not materially change. For purposes of the analyses in Chapter 4.0, it is estimated that the decrease in surface disturbance for this alternative as compared to the Proposed Action would be about 20 percent. Annual operating requirements such as manpower, traffic, water, supplies, and utilities would be similar to that for the Proposed Action. However, total (mine life) disturbance would be reduced and consumption factors would vary. These issues are specifically addressed for each resource discussed in Chapter 4.0.

5. The reduced project size alternative would not include the offsite mitigation measures discussed in Section 2.2.4 that were volunteered by Canyon as an integral part of the Proposed Action.

2.3.4.4 Balanced Waste Rock Piles

1. The proposed project configuration is substantially limited by the WSA boundaries that surround the site. As long as these areas are under the wilderness review process, there cannot be changes to the land within the WSA that cannot be removed or made substantially unnoticeable. For this reason, the Proposed Action has been designed to avoid infringement into the WSA areas.

2. If these WSAs are determined by Congress not to be appropriate for wilderness status, they will be opened to multiple use, including mineral development. In this event, a modified waste rock pile configuration could be employed. The modified configuration would reduce visual impacts of the project and slightly reduce haul distances and related dust and fuel burning emissions. This modified configuration would consist of adjusting waste rock pile configurations to produce a more "balanced" waste rock tonnage distribution between the north and south piles. The modified configuration is shown in Figure 2.25. Key parameters as compared to the proposed configuration are shown in Table 2.12. The balanced piles would be constructed the same as for the Proposed Action with regard to material dumping, benching configurations and slope angles, storage of protore, etc. Reclamation measures would also be the same as for the Proposed Action but, as shown in Table 2.12, there would be minor differences in the acreage of disturbance and the acreage of pile tops and benches that would be reseeded.

3. The acreage of disturbance for the project under the balanced waste rock piles alternative would be about the same as for the Proposed Action (i.e., approximately 505 acres). The modified piles may encompass about 5 acres more, but this would be offset by a reduction of disturbance for site roads. The location of the mine office and shop/warehouse and the main onsite road to these buildings would be shifted slightly for site efficiency, as shown in Figure 2.25. Operational aspects of the project would be the same as discussed for the Proposed Action in Section 2.2.2. Canyon has volunteered to include the offsite mitigation measures discussed in Section 2.2.4 in this alternative.

4. The balanced waste rock piles would slightly reduce air quality impacts by decreasing the average haul distance for waste rock, with associated reductions in fuel use, and dust and fuel burning emissions. Visual impacts would be less than for the Proposed Action, because the modified pile configuration would more closely follow the dominant natural surface forms and visual lines. These and other differences in environmental effects that could occur due to this alternative are discussed in detail in Chapter 4.0.

5. The balanced waste rock piles configuration could only be employed if areas adjacent to the project are released from WSA status and returned to multiple use lands (see Section 3.7 for detailed discussion of WSAs).

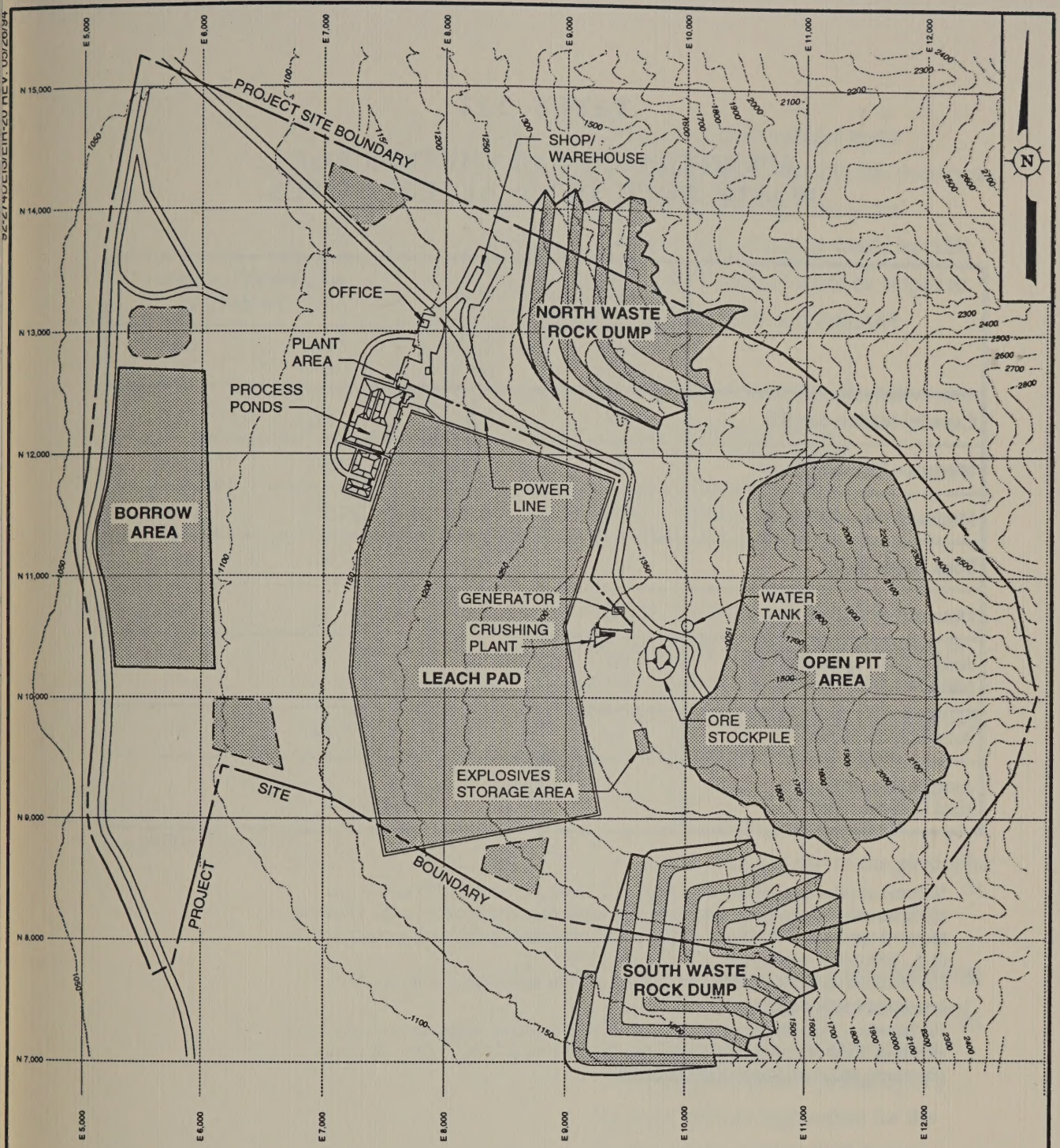


FIGURE 2.25

SITE PLAN FOR BALANCED WASTE ROCK PILES ALTERNATIVE

BRIGGS PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

REFERENCE: CANYON, 1993b.

TABLE 2.12

APPROXIMATE PARAMETERS FOR WASTE ROCK DUMP ALTERNATIVES

PARAMETER	PROPOSED DESIGN		BALANCED DUMPS ALTERNATIVE	
	North Dump	South Dump	North Dump	South Dump
Capacity (million tons)(1)	19	8	10	17
Maximum Elevation (feet)	1,600	1,700	1,600	1,700
Minimum Elevation (feet)	1,140	1,260	1,220	1,140
Total Height (feet)	460	440	380	560
Disturbance Area (acres)	92	34	53	78
Area of Pile Top and Benches (acres)(2)	51	10	29	31
Area of Rock Slopes(3)	41	24	24	47
Average Round Trip Haul Distance (feet)	5,850		5,760	

92-274 (4/29/95/cm)

(1) Volume of piles as configured in Figures 2.3 and 2.25 is larger to assure that environmental analyses consider potential worst-case disturbances while allowing required operational flexibility to accommodate actual conditioning encountered (e.g., volume of waste rock, stability properties, etc.).

(2) Reclamation includes surface scarification, growth media placement, seedbed preparation and reseeding.

(3) Reclamation includes measures to control erosion, reduce visual impacts and leave slopes in a stable condition, as discussed in Section 2.2.3.4.1. Growth media placement and reseeding would not occur.

2.3.4.5 Partial Backfilling

1. As discussed in Section 2.3.3.2, technical difficulties and other disadvantages make complete pit backfilling infeasible. Partial backfilling is considered in detail in this document because it does not have the technical difficulties of complete backfilling. The partial backfilling configuration considered as an alternative to the Proposed Action would backfill the mine pit to the lower (west) side of the pit rim. The backfill surface would be sloped to drain at approximately the same grade as the surface of the alluvial fan.

2. The primary differences between this alternative and the complete backfilling alternative are:
   - The partial backfilling alternative is technically feasible because problems associated with the steep slope of the backfill configuration are eliminated.
   - The volume of broken and excavated rock and ore residue that would be removed from aboveground piles would be less, with correspondingly reduced restoration of premining topography and related visual effects.

3. Post-mining topography for the partial backfilling alternative is shown in Figure 2.26. The topography shown is based on the maximum potential mine development as shown in Figures 2.3 and 2.4. About 50 acres of the pit footprint would be backfilled. Most of the fill surface would be graded at a slope of about 8 to 10 percent. Approximating the existing fan slope, this grade would result in sediment transport conditions similar to natural conditions. A small area between the northern and southern portions of the pit would be graded at about 25 percent due to the higher elevation of the northern part of the pit. Drainage from Redlands Canyon would be directed toward the southern end of the pit similar to the current drainage path.

4. Analysis of the partial backfilling alternative in this document considers that if this alternative were implemented, overburden piling from the beginning of the mine life would be planned to minimize backfilling efforts. Figure 2.27 shows a possible modified pile configuration that could reduce backfilling efforts. This modified configuration consists primarily of raising the top elevation of the north waste rock dump about 300 feet higher than for the Proposed Action, to a total vertical height of about 775 feet, moving the overall dump configuration slightly eastward. As for the Proposed Action, the dump would be built outward from the flank of the Panamint Range slopes. Because of constraints of the surrounding WSA and the need to divert the Redlands Canyon drainage during operations, the southern waste rock dump would remain unchanged. Except for the north waste rock dump and the final site topography, locations and configurations of other site facilities would not materially change. Because of the modified north waste rock pile, total disturbed acreage for

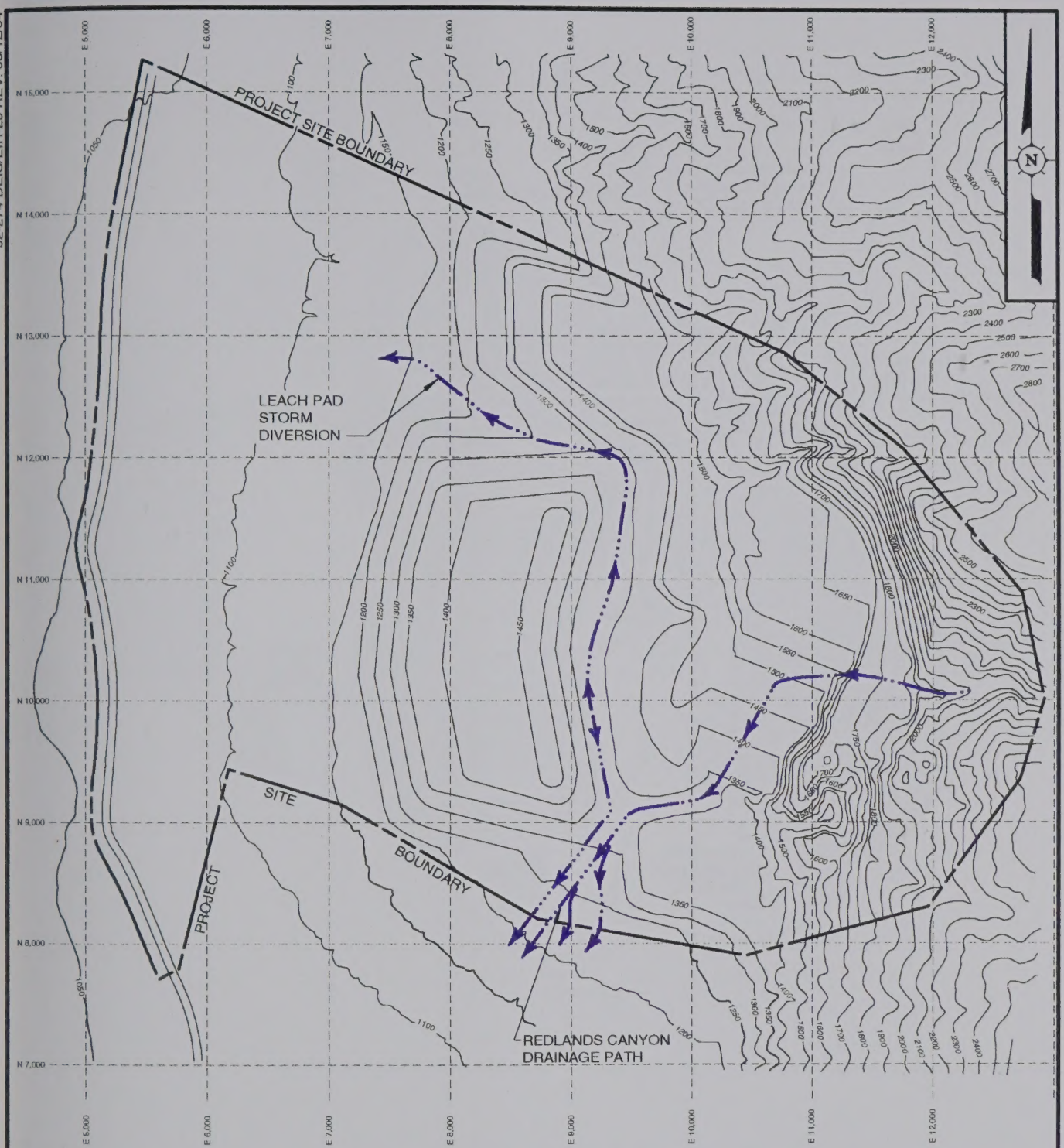
the site under this alternative would increase by about 13 acres as compared to the Proposed Action. Site operations for this alternative would be the same as for the Proposed Action, except for backfilling.

5. Based on the maximum mining configuration layout shown in Figure 2.3, about 25 percent of the material excavated from the mine pit would be backfilled. Heap leach material would not be used for backfill. The heap leach pile would be left in place, regraded, and reclaimed the same as for the Proposed Action. All of the backfill material would be obtained from the waste rock piles.

6. Waste rock material closest to the pits would be used for backfill so that haul distances are minimized. Based on about half of the backfill material coming from the north and south waste rock pile, respectively, most of the south pile would be removed, with the remainder graded into an approximately 100-foot high mound with slopes of about 3H:1V. Material removed from the north waste rock dump would be taken from north and immediately west of the mine pit reducing the final height of the pile to an elevation of about 1,500 feet. The western portion of the pile would remain unchanged. A comparison of waste rock pile sizes before and after backfilling is shown in Table 2.13.

7. Figure 2.28 illustrates the areas of the mine pit and waste rock piles where reclamation would include placement of growth media, seedbed preparation and reseeding. Partial removal of waste rock for backfilling would re-expose portions of the mountain slope at the east side of the piles. Most of this re-exposed slope area would be too steep for safe or efficient growth media placement, seedbed preparation, or reseeding. These areas would generally have slopes of about 2H:1V or steeper. Acreages that would and would not undergo growth media application, seedbed preparation and reseeding are summarized in Table 2.13. The partial backfilling alternative would not include the offsite mitigation measures discussed in Section 2.2.4.

8. Environmental effects of the partial backfilling alternative are discussed in detail in Chapter 4.0.



0 1,200 2,400 FEET
SCALE

FIGURE 2.26

FINAL SITE TOPOGRAPHY FOR PARTIAL BACKFILLING ALTERNATIVE

BRIGGS PROJECT

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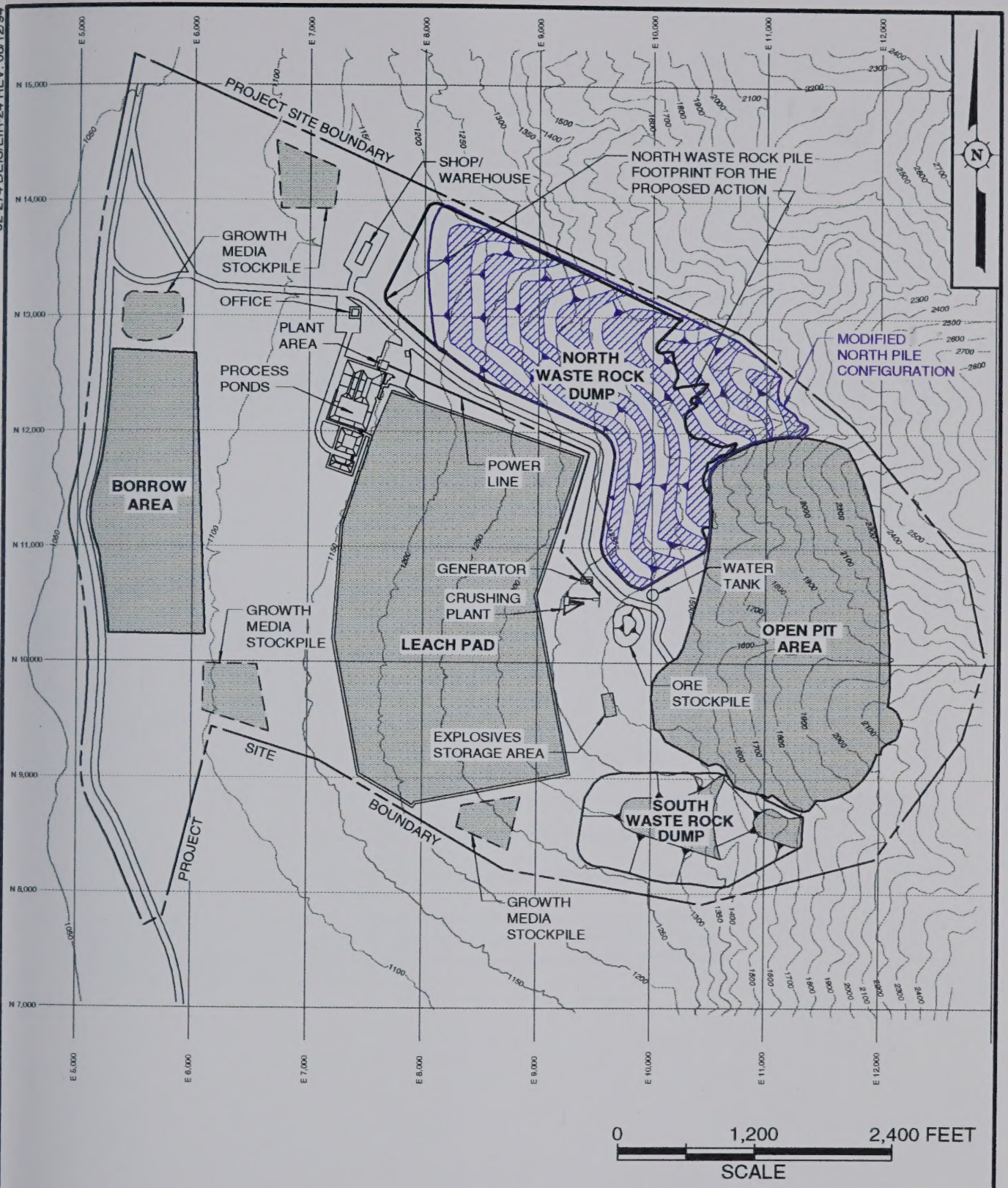


FIGURE 2.27

NORTH WASTE ROCK PILE CONFIGURATION FOR PARTIAL BACKFILLING ALTERNATIVE

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TABLE 2.13

KEY PARAMETERS FOR WASTE ROCK DUMP COMPARISON OF PROPOSED ACTION AND PARTIAL BACKFILLING ALTERNATIVE

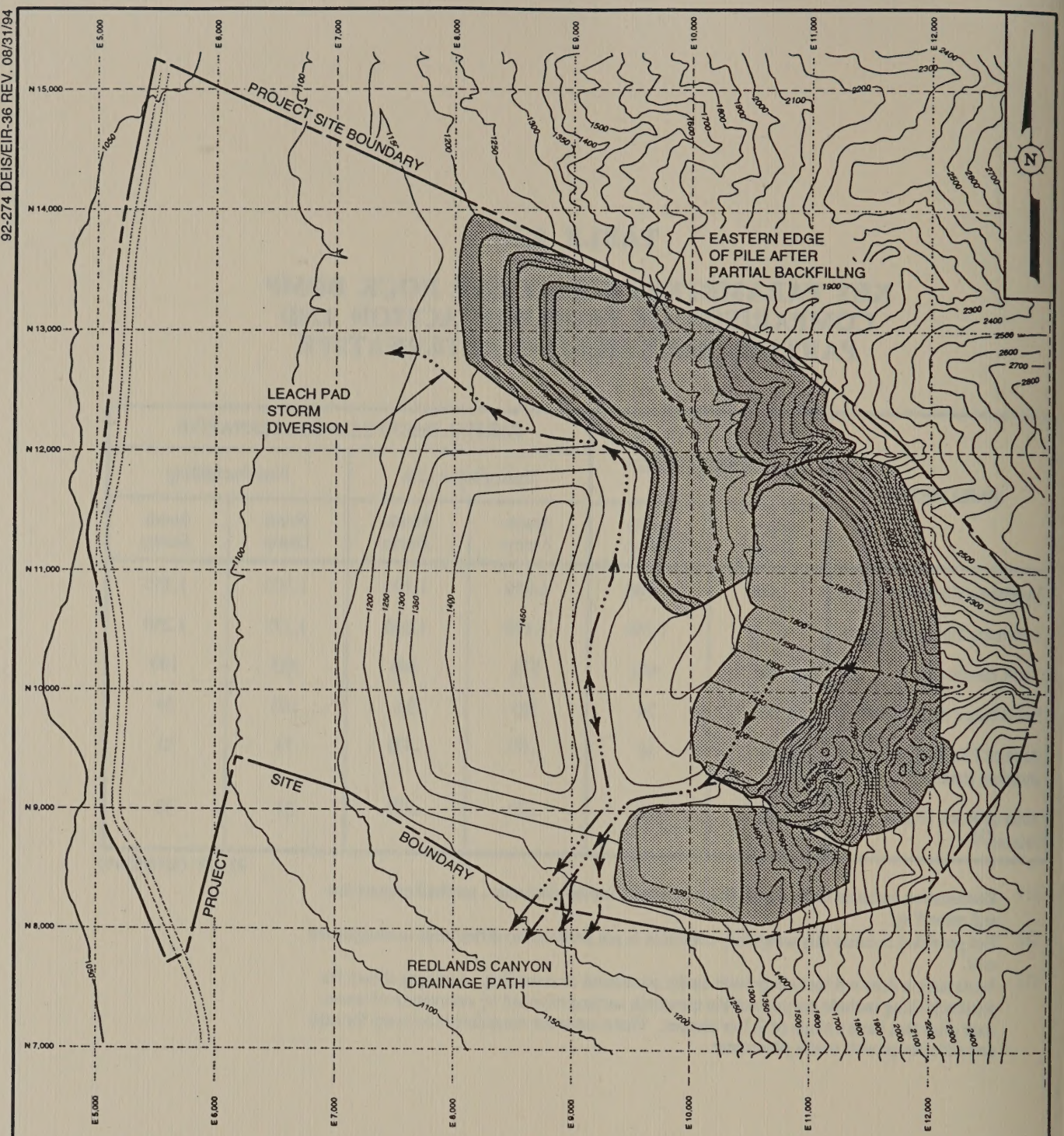
PARAMETER	PROPOSED DESIGN		PARTIAL BACKFILLING ALTERNATIVE			
			End of Mine Life		Post-Backfilling	
	North Dump	South Dump	North Dump	South Dump	North Dump	South Dump
Maximum Elevation (feet)	1,600	1,700	1,950	1,700	1,500	1,350
Minimum Elevation (feet)	1,140	1,260	1,175	1,260	1,175	1,250
Total Height (feet)	460	440	775	440	325	100
Disturbance Area (acres)	92	34	105	34	105	34
Area of Pile Top and Benches (acres)(1)	51	10	--(2)	--(2)	74	21
Area of Rock Slopes (acres)(3)	41	24	--(2)	--(2)	31	13

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(1) Reclamation includes surface scarification, growth media placement, seedbed preparation and reseeding.

(2) Not provided because this temporary condition is not pertinent to differences in revegetated area.

(3) Reclamation does not include growth media placement or reseeding. Acreages shown for postbackfilling include portions of the mountain surface exposed by excavation of waste rock piles that have a slope of 2:1 or steeper. These areas are considered too steep for safe and efficient growth media placement.



LEGEND

PORTIONS OF THE MINE PIT AND WASTE ROCK PILES WHERE GROWTH MEDIA WOULD BE PLACED AND RESEEDING WOULD OCCUR.

PORTIONS OF THE MINE PIT AND WASTE ROCK PILE DISTURBANCE FOOTPRINT THAT WOULD BE TOO STEEP FOR SAFE AND EFFICIENT GROWTH MEDIA PLACEMENT. NO GROWTH MEDIA PLACEMENT OR RESEEDING WOULD OCCUR.

0 1,200 2,400 FEET
SCALE

FIGURE 2.28

REVEGETATED MINE PIT AND WASTE ROCK PILE AREAS FOR PARTIAL BACKFILLING ALTERNATIVE

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2.3.4.6 Consideration of Alternatives

1. Environmental impacts that could occur due to the Proposed Action, and differences in these impacts that would be expected for each of the alternatives to the Proposed Action, are discussed in detail in Chapter 4.0. Section 4.14 provides a summary to comparatively evaluate the alternatives and key differences in impacts. Chapter 4.0 also discusses mitigation measures developed through the preparation of this Draft EIS/EIR that are recommended to reduce impacts of the project. These measures are recommended for implementation in addition to mitigation incorporated by project design. The additional recommended mitigation measures in Chapter 4.0 are equally applicable to the Proposed Action and any of the alternatives, except the No Action Alternative.

2. Section 15126(d)(2) of the CEQA implementing guidelines requires that, of the alternatives addressed in an EIR, one be identified as "environmentally superior." If the environmentally superior alternative is the No Action Alternative, then the EIR shall also identify an environmentally superior alternative among the other alternatives.

3. Of the alternatives identified in this Draft EIS/EIR, the No Action Alternative is environmentally superior. Of the remaining alternatives, the environmentally superior alternative is the balanced waste rock piles alternative plus the recommended additional mitigation. In addition to being environmentally superior in comparison to the remaining alternatives, the balanced waste rock piles alternative would be environmentally superior to the Proposed Action if the WSA status of lands adjacent to the project site is removed by the pending DPA. None of the remaining alternatives are environmentally superior to the Proposed Action with offsite mitigation.

4. Federal regulations require that a Draft EIS identify the NEPA lead agency's "preferred alternative" if one exists (40 CFR 1502.14[e]). The preferred alternative is the one that the lead agency believes would fulfill its statutory mission and responsibilities, giving consideration to economic, environmental, technical, and other factors. Even though the lead agency's preferred alternative is identified, the EIS must objectively evaluate all of the alternatives.

5. Cost alone is not an overriding consideration for BLM in their determination of the preferred alternative. BLM staff, in their recommendations to management, must consider other factors in their examination of the range of alternatives. Other important factors include:

   - Determining what is usual, customary and proficient in the mining industry in the western United States.
   - Providing for a productive post-mining land use of the pit area after completion of mining (the management goal for productive post-mining use is "no net loss" to overall resource values and land use opportunities).
   - Providing for measures to protect human health and safety.
   - Providing reasonable measures to protect the scenic, scientific and environmental values of the area impacted by mining.
   - Evaluating the potential for future mining from remaining mineralization that is not now economic.
   - Considering the long-term and short-term impacts of alternatives as compared to the Proposed Action.
   - Considering whether post-mining land management by BLM would require an "active" program (i.e., inspection, compliance and enforcement by BLM staff) or a "passive" program (as was the condition prior to mining).

6. The EIS should also identify the "environmentally preferable" alternative (46 Federal Register 18026; 3/23/81, as amended, 51 Federal Register 15618; 4/25/86). The environmentally preferable alternative is the alternative that best promotes the national environmental policy expressed in NEPA. Generally, this means the alternative that causes the least damage to the environment and best protects natural and cultural resources.

7. Both the BLM preferred and NEPA environmentally preferable alternative is the balanced waste rock piles alternative plus the recommended additional mitigation. However, this alternative could not be implemented unless lands surrounding the project site are released from WSA and returned to multiple use status. If lands adjacent to the site remain WSA, the BLM preferred and NEPA environmentally preferable alternative would be the Proposed Action plus the recommended additional mitigation.

CHAPTER 3.0
AFFECTED ENVIRONMENT

3.0 AFFECTED ENVIRONMENT

3.1 INTRODUCTION

1. This chapter provides a description of existing resources and environmental conditions that have the potential to be affected by the Briggs Project or influence aspects of the project. Data and analysis are commensurate with the importance of the impact, with less important material summarized, consolidated and referenced. The discussions in this chapter, and the description of the Proposed Action and alternatives provided in Chapter 2.0, provide the basis for the evaluation of potential environmental impacts included in Chapter 4.0. The discussion in this chapter is required pursuant to 40 CFR 1502.15 and 14 CCR 15125.

2. Discussion of existing resources and environmental conditions are provided in the following sections:

   - 3.2 - Topography, Geology and Soils
   - 3.3 - Water Resources
   - 3.4 - Vegetation
   - 3.5 - Wildlife
   - 3.6 - Air Quality
   - 3.7 - Land Use, Recreation and Wilderness
   - 3.8 - Visual Resources
   - 3.9 - Cultural Resources
   - 3.10 - Transportation
   - 3.11 - Noise
   - 3.12 - Socioeconomics
   - 3.13 - Environmental Health and Safety

   As appropriate, these sections provide discussion of regional and local conditions, to allow a comprehensive evaluation of the potential impacts.

3. Some sections within this chapter indicate that detailed technical reports are incorporated by reference. Reports that are incorporated by reference are available for review at the offices of BLM and the County.

3.2 TOPOGRAPHY, GEOLOGY AND SOILS

3.2.1 TOPOGRAPHY

3.2.1.1 Regional Topography

1. The Briggs Project site is located within the Basin and Range physiographic province which is characterized by generally north-south trending, isolated, elongated, subparallel mountain ranges surrounded by gently sloped coalesced alluvial fan surfaces (bajadas), and separated by nearly flat-floored valleys or basins. These topographic features are the result of regional tectonic extension and normal faulting that slowly pulled the mountain ranges apart and displaced the valley floors downward in relation to the adjacent ranges.

2. Within the Basin and Range province, drainage is regionally closed; that is, surface waters flow to basin lows and evaporate or infiltrate. As a result of the runoff, surface materials are eroded from the uplands and deposited as alluvium on the adjacent valley floors. Through this process, thick sequences of alluvial sediments have accumulated within the basins.

3. The Briggs Project site is located in southern Panamint Valley at the base of the Panamint Range that borders the valley along the east side (Figure 3.2.1). The Panamint Range reaches a maximum elevation of 11,049 feet above mean sea level (MSL) at Telescope Peak, 17 air miles north-northeast of the Briggs Project site, and separates Panamint Valley from Death Valley to the east. In the vicinity of the project site, the slopes of the Panamint Range are asymmetric. The eastern slopes bordering Death Valley are relatively shallow compared to the western slopes bordering Panamint Valley, which are very steep.

4. Panamint Valley is about 70 miles long. The valley floor is up to 12 miles wide. Towards the southern end of the valley where the project site is located, the floor is about two to five miles wide and occurs at an elevation of about 1,050 feet above MSL. A flat playa (dry lakebed) surface occupies the low portion of the valley floor. The western side of the valley is bordered by the Argus Range and Slate Range.

3.2.1.2 Local Topography

1. The Briggs Project site is located at the bottom of the west-facing slopes of the Panamint Range and on the gentler alluvial slope at the foot of the mountains (Figure 3.2.2). The mountain slopes in the vicinity are very steep with grades often exceeding 100 percent. These slopes are deeply incised by a number of canyons that drain the upland areas.

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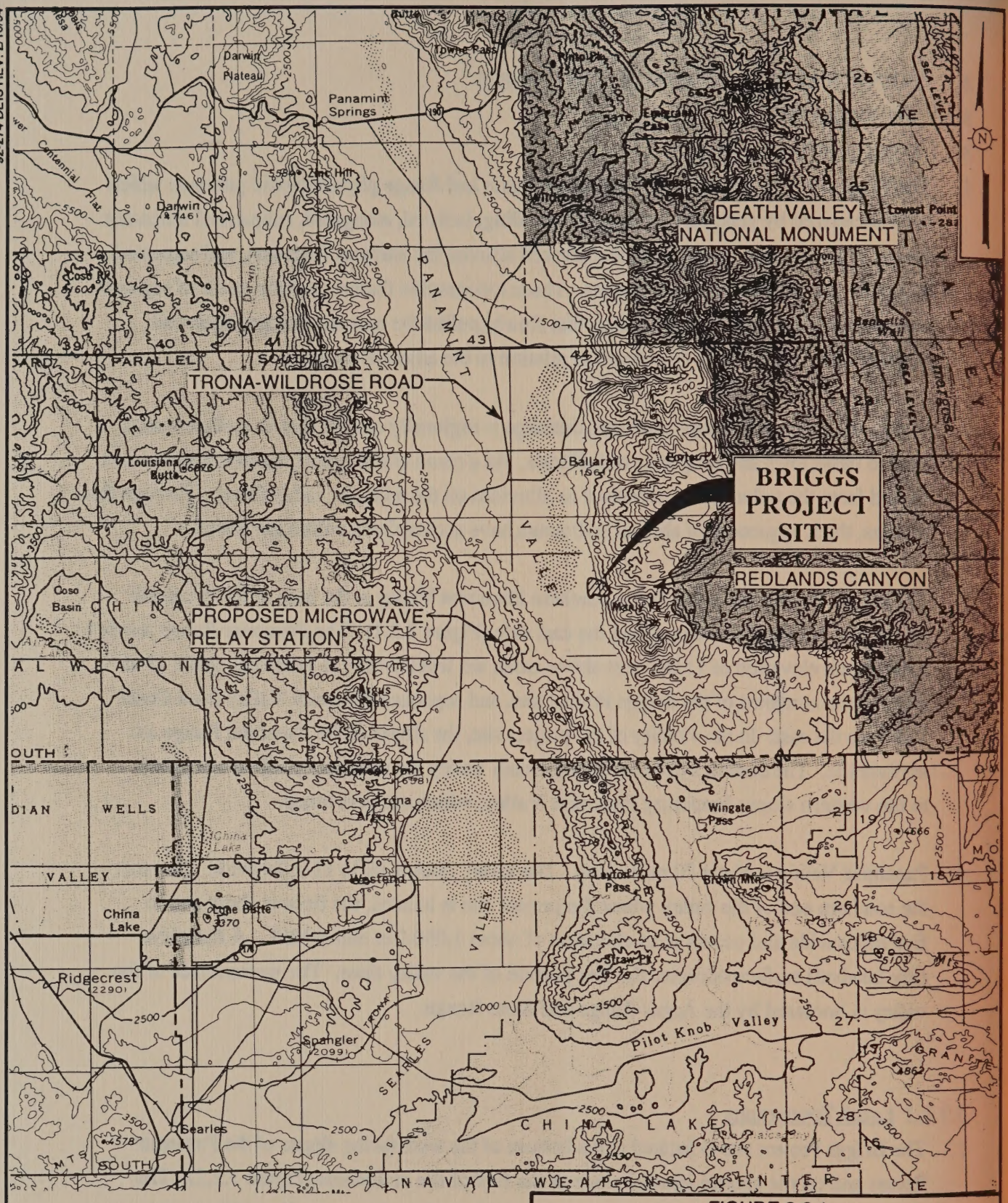


FIGURE 3.2.1

REGIONAL TOPOGRAPHY

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REFERENCE:
USGS MAP OF THE STATE OF CALIFORNIA, SOUTH HALF, 1:500,000, COMPILED IN 1968, REVISED 1981.

92-274.DE1S REV. 8/20/93A

PANAMINT VALLEY

23S/44E-3N1
(1026)

SUMP
(1043)

MW-3
(1044)

SITE BOUNDARY

APPROXIMATE LOCATION OF
PROPOSED PRODUCTION WELLS

MW-1
(1047)

MW-2
(1048)

P-1
(1122)

FAULTS

REDLANDS
SPRINGS
(SW-1)

B

B'

Big Horn

Redlands

Manly Fall

Prospect

1025
1030
1035
1040
1045

LEGEND

- P-1 — MINE PIT AREA PIEZIOMETER
- 1045 — ESTIMATED WATER TABLE ELEVATION CONTOUR (IN FEET)
- MW-1 (1047) — EXISTING BRIGGS PROJECT MONITORING WELL (WATER LEVEL ELEVATION, IN FEET, INDICATED IN PARENTHESIS)
- PROPOSED BRIGGS PROJECT PRODUCTION WELL
- SUMP (WATER LEVEL ELEVATION, IN FEET, INDICATED IN PARENTHESIS)
- GOVERNMENT TEST WELL (ABANDONED) (WATER LEVEL ELEVATION, IN FEET, INDICATED IN PARENTHESIS)
- B — B' CROSS SECTION LOCATION (SEE FIGURE 3.3.5 FOR CROSS SECTION)

0 2,000 4,000 FEET
SCALE
CONTOUR INTERVAL: 10 METERS

REFERENCES:
1. USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE MAP OF MANLY PEAK, CALIFORNIA DATED 1984.
2. WATER TABLE CONTOURS FROM WESTEC, INC., 1993c.

FIGURE 3.2.2

SITE TOPOGRAPHY AND VICINITY WELLS

BRIGGS PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

2. The project site is located at the mouth of Redlands Canyon, a steep, narrow, V-shaped canyon. The floor of the canyon has a vertical drop over 100 feet high, known as Manly Fall, located near the canyon terminus (Figure 3.2.3). The steep canyon and Manly Fall have been formed by high energy erosion into the basement rock of the Panamint Range, during late Quaternary time, as a result of uplift of the range in relation to the valley floor.

3. On the lower few hundred feet of the west facing slopes in the vicinity of Redlands Canyon, the topography has been modified by the construction of exploration drill roads (Figure 3.2.3). These roads result in a stepped topography, with the roads about 12 feet wide at typical vertical intervals of about 50 to 100 feet, separated by the steep natural slopes and talus from roadcut sidecast material.

4. A well developed alluvial fan occurs at the mouth of Redlands Canyon. The heap leach pad and other facilities would be located on this alluvial fan surface which slopes radially outward from the mouth of Redlands Canyon at about 6 to 12 percent (3 degrees to 7 degrees). The alluvial fan surface is characterized by a series of shallow-braided washes with the most recent active drainage course projecting toward the southwest (Figure 2.2). The flat playa surface begins west of the Briggs Project site and Wingate Road.

5. The local elevation ranges from less than 1,050 feet above MSL on the valley floor west of the project, up to 7,196 feet above MSL at Manly Peak about four miles to the southeast. The elevation of the project site ranges from about 1,060 feet to 2,600 feet above MSL.

3.2.2 GEOLOGY, FAULTING AND SEISMICITY

3.2.2.1 Regional Geology

1. The Panamint Range is comprised of some of the oldest types of bedrock identified in the western United States. The oldest rock type within the range has been dated at 1.8 billion years of age and consists of metamorphosed sedimentary and volcanic assemblages which predate the formation of the Cordilleran continental margin (land evolution between the Rocky Mountains and the Pacific Ocean).

2. The Panamint Range has been subjected to range-wide folding, faulting, metamorphism, and igneous intrusion. Figure 3.2.4 provides a cross sectional view from east to west through the Panamint Range illustrating the interpreted geologic structure.

3. In a very general manner, the Panamint Range consists of a north-south trending antiform (upwarped structure) that has been broken by normal faults, intruded by a variety of igneous rocks, and superimposed with low angle detachment (extensional) faults. The detachment faults juxtapose Precambrian (greater than 570 million years old) rocks of three different ages (Upper, Middle and Lower Proterozoic).

4. The detachment faulting and associated normal faulting occurred during Miocene and Pliocene time, or 10.6 to 3.7 million years ago (Ma), and downdropped the basins relative to the ranges. As the adjoining basins dropped, they were filled with alluvial outwash eroded from the highland areas. In southern Panamint Valley these alluvial deposits are at least 1,000 feet thick. Infilling of the basin occurs through present time. Fine-grained lake (lacustrine) deposits are included in the sedimentary sequence, deposited during interglacial periods when lakes occupied basins throughout the province.

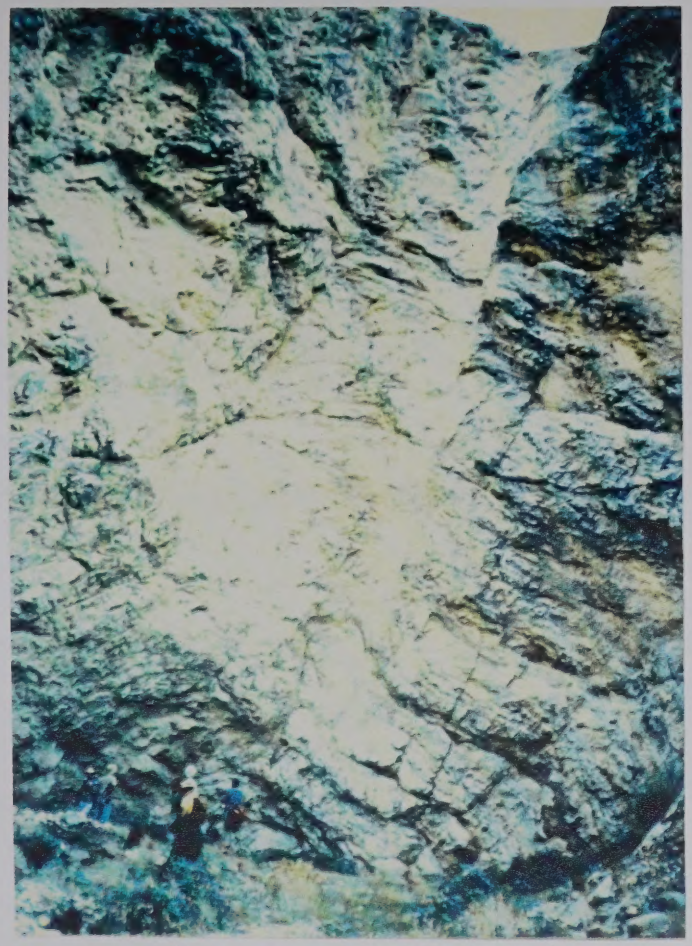
5. From the late Pliocene epoch and through the Quaternary period (3.6Ma to present) the dominant tectonic regime along the western Panamint Range front has been strike-slip faulting (i.e., dominantly horizontal movement) with subordinate dip-slip (vertical) movement. This more recent tectonic regime is displacing the Panamint Range southward relative to Panamint Valley along range bounding right lateral strike-slip and normal down-to-the-west listric (flattening with depth) faults. Faulting aspects of the region are further discussed in Section 3.2.2.3.

3.2.2.2 Local Geology

1. Two dominant types of bedrock comprise the lower slopes of the Panamint Range in the site area. A detachment fault zone separates the two types of bedrock and forms an undulatory discontinuity that subparallels the west flank slope surface and lies at relatively shallow depths as shown in Figure 3.2.4.

2. The upper plate rocks, lying above the fault, are granitic and of Mesozoic (65Ma to 230Ma) age. These rocks are generally light colored, very fractured, stretched, weathered, and have been structurally deformed and transported thousands of feet from their origin. The upper plate rock thickness varies from zero to over 100 feet in the site area.

3. Beneath the detachment fault is an unknown thickness of Precambrian metasedimentary and metavolcanic basement rocks which are locally composed of gneiss and amphibolite-gneiss



Close-up view of Manly Fall.



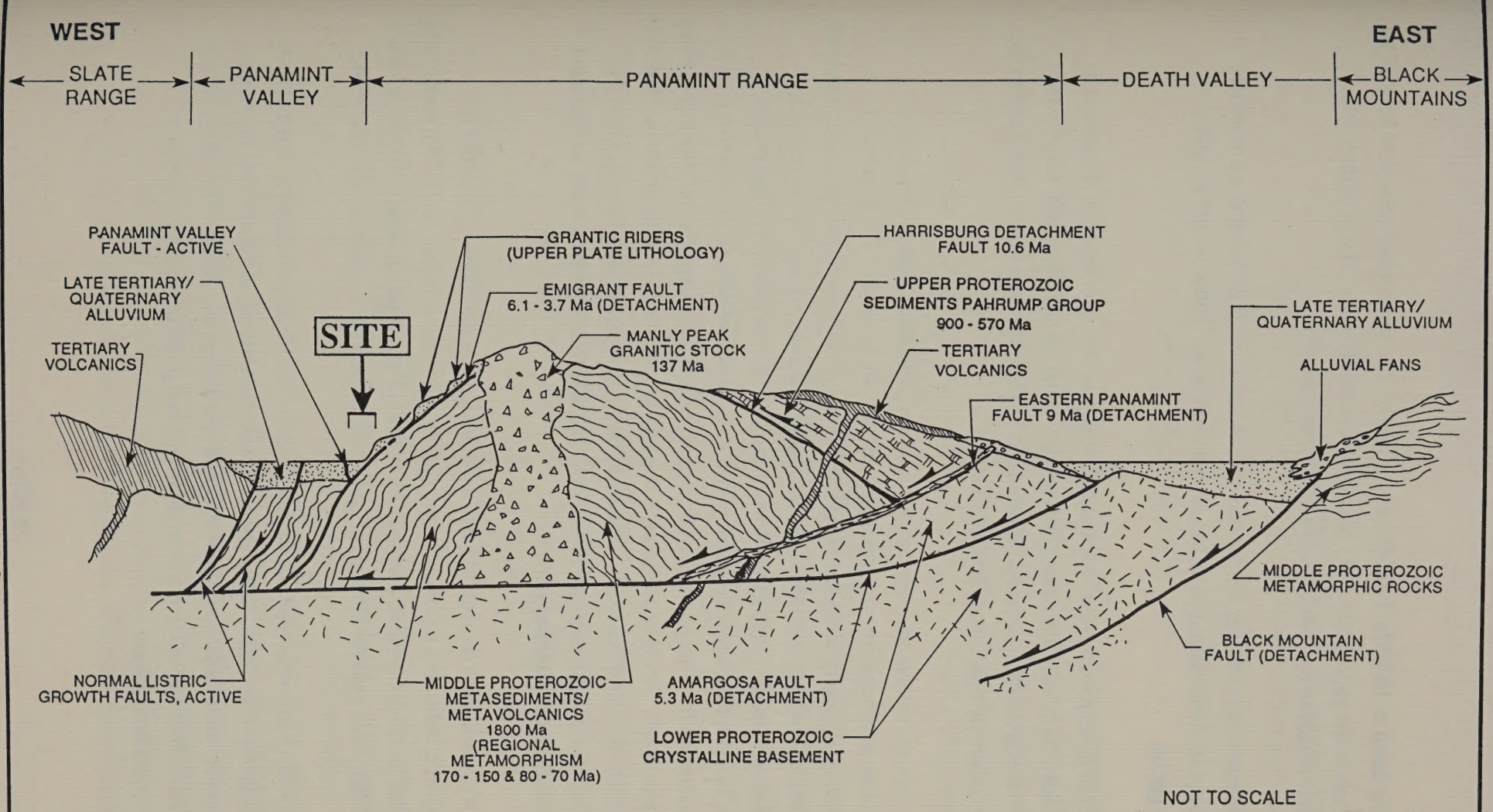
View eastward of Manly Fall and Redlands Canyon from Wingate Road at the western project boundary. Exploration drilling roads are present on the west facing slopes north and south of the canyon.

FIGURE 3.2.3

VIEW OF MANLY FALL AND REDLANDS CANYON

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NOT TO SCALE

NOTE: Ma = MILLIONS OF YEARS BEFORE PRESENT.

REFERENCE: ADAPTED AFTER HODGES et al., 1990.

FIGURE 3.2.4

SCHEMATIC EAST-WEST CROSS SECTION THROUGH THE SITE AREA LOOKING NORTH

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that have been dated at 1800Ma (Lobotka, et al., 1980). The lower plate basement host rocks are exposed where the upper plate rocks have been eroded through. They continuously outcrop on side slopes in the lower reaches of Redlands Canyon.

4. Gold mineralization of the Briggs Project ore body is confined to the lower plate basement rocks. Native gold, in its natural state, has been disseminated within the gneiss and amphibolite-gneiss.

5. A thin veneer of loose rock debris (talus and colluvium) occurs over much of the irregular west-facing slope surfaces of the range front. Coarse stream alluvium locally mantles the canyon floor among bedrock outcrops. Most of the surficial deposits on the slopes and in the drainages are relatively thin, not exceeding 10 feet.

6. Alluvial fan deposits extend out from the mouth of Redlands Canyon and consist of gravel to boulder size fragments supported in a silty to sandy matrix. These materials are semiconsolidated but poorly cemented except locally where calcium carbonate has accumulated, forming a caliche. Bedding is poorly developed, generally massive and heterogeneous conditions prevail. Bedding attitudes (dip and strike) mimic the ground surface profile. Based on the degree of fan incision, development of a patina surface and presence of relic lake shoreline features on the lower portion of the fan, the alluvial fan deposits are considered to be late Pleistocene in age. At depth, the alluvial deposits are interbedded with lacustrine (lakebed) sediments which were simultaneously deposited during interglacial high lake stands of the Pleistocene epoch (10,000 years ago to 1.8Ma). The lakebed deposits consist of fine sand, silt and clay with some evaporite salts.

7. Monitoring wells drilled as deep as 345 feet from the fan surface (Figure 3.2.2) did not penetrate bedrock, indicating the rock surface rapidly increases in depth west of the range front. A nonproject related boring (Well 23S/44E-3N1) drilled to a depth of nearly 1,000 feet near the center of the playa opposite Redlands Canyon did not encounter bedrock (Smith, 1964).

8. There are no known important paleontological resources in the project vicinity. The bedrock and alluvium geologic domains, where onsite disturbances would occur, are not likely to be fossil-bearing because of their mode of deposition and diagenisis. If one of the playa borrow locations is used, the probability of important fossils being discovered is low because disturbance would be surficial.

3.2.2.3 Regional and Local Faulting

1. The extensive length of geologic time represented by rocks in the project vicinity (i.e., Precambrian through present) results in several series of structures and faults, most of which are unrelated to the geologically recent tectonic regime. This section focuses on faulting that is pertinent to the existing tectonic regime and related seismicity. An overview of ancient tectonic processes is provided in Section 3.2.2.1.

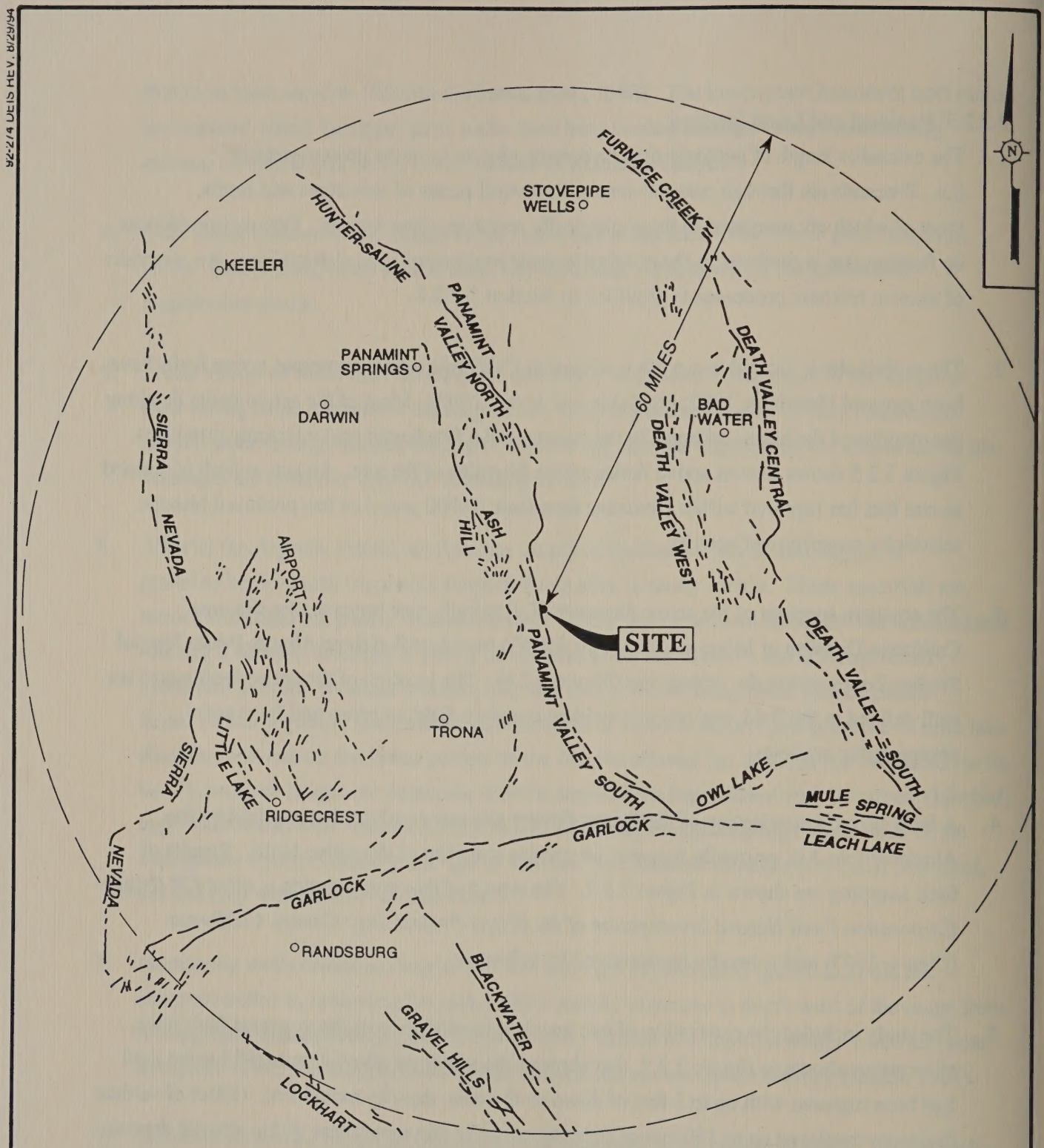
2. The project site is located in a portion of eastern California where numerous active faults have been mapped (Jennings, 1992; Maulchin and Jones, 1992). Most of the active faults lie along the margins of the basins adjacent to the ranges, and a few bound major tectonic provinces. Figure 3.2.5 shows known active faults within 60 miles of the site. An active fault is defined as one that has ruptured within Holocene time (last 10,000 years) or has produced historic seismicity suggestive of activity.

3. The southern segment of the active Panamint Valley fault zone traverses the site area. California Division of Mines and Geology (DMG) has identified three Alquist-Priolo Special Studies Zones within the project site (Figure 3.2.6). The location of the active fault traces are well defined in the field, and are very evident based on field mapping and from aerial photographic analyses.

4. A fault hazard investigation of the Briggs Project site was conducted as required by the Alquist-Priolo Act, primarily focusing on precise mapping of the active faults. Results of fault mapping are shown in Figure 3.2.7. The report of this investigation is titled *CR Briggs Corporation Fault Hazard Investigation of the Briggs Project, Inyo County, California* (Cleary, 1993) and is hereby incorporated by reference.

5. The study included the excavation of two backhoe trenches across the youngest fault trace, at locations shown in Figure 3.2.7, that showed the youngest alluvial units (Holocene age) had been ruptured with up to 3 feet of down-to-the-east, dip-slip movement. Offset of surface drainages displayed up to 150 feet of right lateral strike slip movement within alluvial deposits of less than 20,000 years of age. The fault had a surface trace approximately 1.2 miles long. Two short minor splay faults (northeast striking), further to the west, displayed 1 to 2 feet of dip-slip displacement (down to the northwest). Cleary (1993) concluded that this younger fault had an average slip rate of about 0.1 inches per year and an occurrence interval ranging between 500 and 2,000 years for a major earthquake. Based on the trenching study, a major

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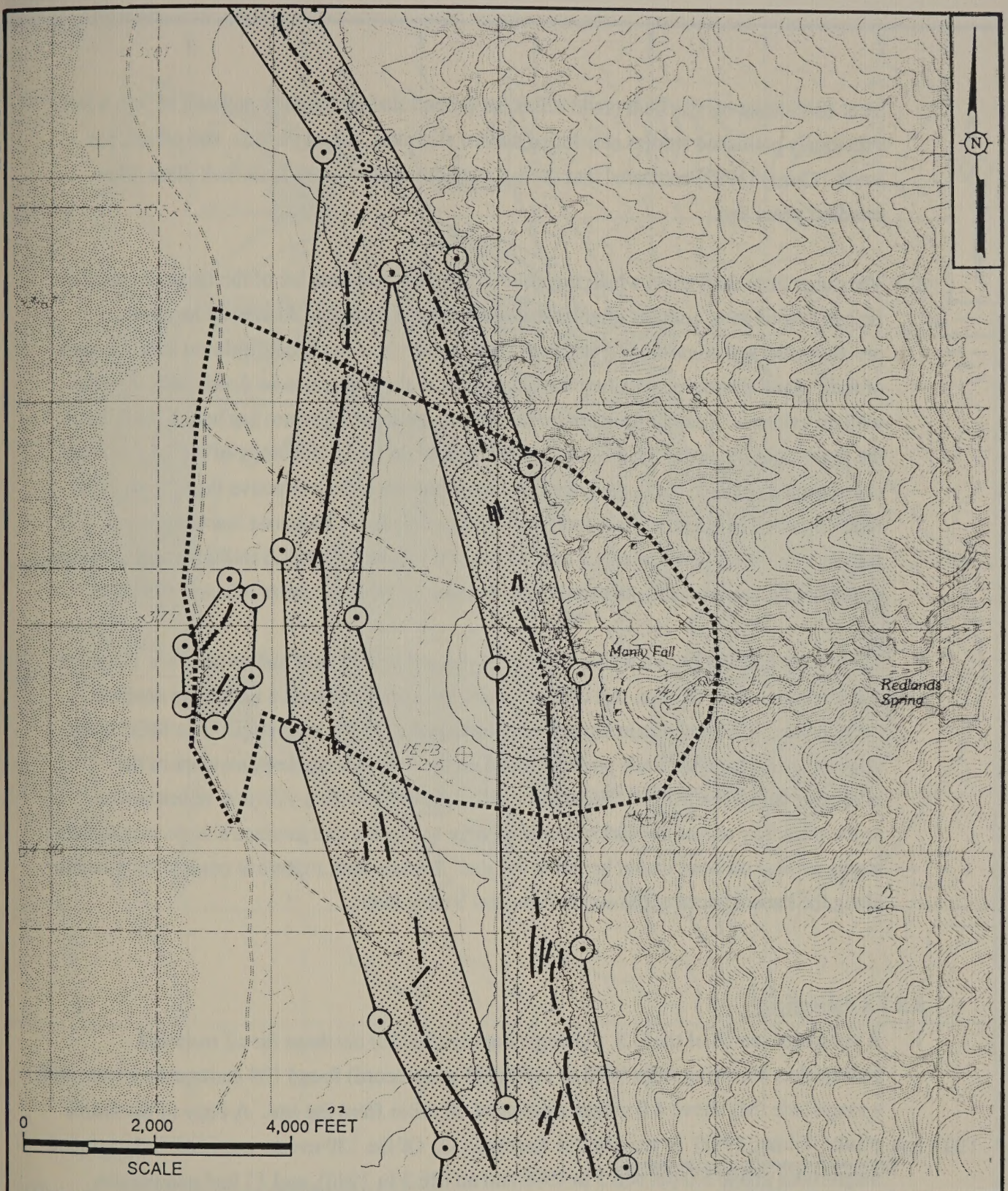
REFERENCE: MODIFIED AFTER JENNINGS, 1992.

FIGURE 3.2.5

ACTIVE FAULTS IN THE SITE REGION

BRIGGS PROJECT

ENVIRONMENTAL SOLUTIONS, INC.



LEGEND

ACTIVE FAULT TRACE AS MAPPED BY DMG

SPECIAL STUDIES ZONE

REFERENCES:

1. USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE MAP OF MANLY PEAK, CALIFORNIA DATED 1984.
2. FAULTS AND SPECIAL STUDY ZONES FROM DMG ALQUIST-PRIOLO MAP OF MANLY FALL QUADRANGLE, DATED 1/1/90.

FIGURE 3.2.6

ALQUIST-PRIOLO SPECIAL STUDIES ZONES IN THE PROJECT VICINITY

BRIGGS PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

local earthquake on this fault could offset the ground surface laterally as much as 3 to 6 feet. Previously published studies concluded similar slip rates, return periods, and offsets per event. Cleary (1993) estimated that the last surface rupture on the fault took place a few hundred years ago.

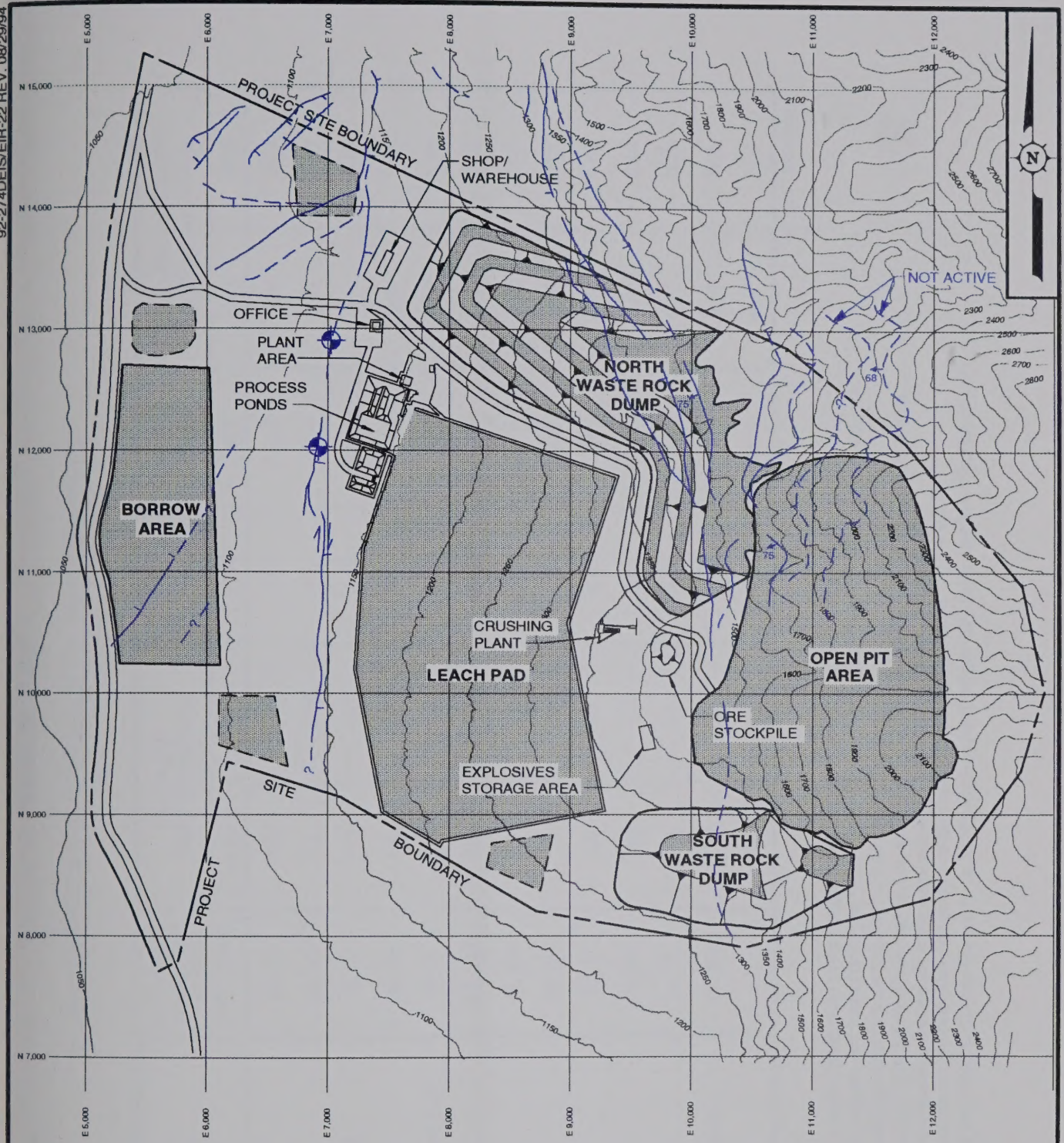
6. The range front fault zone, which traverses along the immediate toe of the mountains in the Briggs Project area, consists of at least seven subparallel traces. At several locations, pre-Holocene age alluvium (greater than 10,000 years old) has been displaced near the apex of fans. Fault displacement along the range front faults appears to be dominantly dip-slip with no evidence of lateral Quaternary fan offset. Younger alluvium has buried portions of the faults near the upper reaches of the fans. Based on the morphology of the fans and age of deposits displaced, the range front fault zone appears to be less active than the westerly fault discussed in the preceding paragraph. This range front fault zone has been in part responsible for uplift of the range of nearly 6,000 feet in the last 1.6 million years and some of the fault traces probably ruptured in the last several hundred years (Cleary, 1993).

7. Table 3.2.1 lists the known active regional faults within a 60-mile radius and their distances and directions from the site. All of these faults have been assigned a maximum credible earthquake (MCE) and maximum probable earthquake (MPE) magnitude. The MCE is the largest earthquake magnitude possible based on the known tectonic framework of the particular fault. The MPE is the largest earthquake event with a 100-year return period. In the event any one of the faults identified were to rupture and produce a major earthquake, strong ground motions would be felt at the site. Surface fault rupture is considered possible along the known traces of the active Panamint Valley fault.

3.2.2.4 Seismicity

1. A computer search of the U.S. Geologic Survey (USGS) database for all recorded earthquakes occurring from 1800 to 1992 (193 year record) found 139 earthquake events with a magnitude (M) above 4.0 within a radius of 60 miles from the site. A copy of the search results (Blake, 1992) is provided in Appendix C. Of the 139 events recorded, only two had magnitudes above 6.0 (an M6.5 in 1908 and an M6.3 in 1946), and 11 had magnitudes ranging between 5.0 and 5.9.

2. The greatest concentration of historic earthquakes in the region is located about 40 miles to the west of the site in the vicinity of the southern Owens Valley and along the eastern



LEGEND

FAULT, DASHED WHERE APPROXIMATELY LOCATED, QUERIED FOR ADDITIONAL UNCERTAINTY. HATCHURE INDICATES DOWNTHROWN SIDE, ARROWS INDICATE HORIZONTAL MOVEMENT DIRECTION

68 DIP OF FAULT PLANE

FAULT INVESTIGATION TRENCH LOCATION

0 1,200 2,400 FEET
SCALE

SOURCES: 1. SITE FACILITY PLAN FROM CANYON, 1993b.
2. INVESTIGATION RESULTS FROM CLEARY, 1993.

FIGURE 3.2.7

ALQUIST-PRIOLO FIELD INVESTIGATION

BRIGGS PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

TABLE 3.2.1

EARTHQUAKE SEISMICITY PARAMETERS

FAULT NAME	DISTANCE/ DIRECTION FROM SITE (miles)	MAXIMUM EARTHQUAKE(M)		PEAK HORIZONTAL[3] ACCELERATION (g)		HIGH REPEATABLE[4] ACCELERATION (g)	
		MCE[1]	MPE[2]	MCE	MPE	MCE	MPE
Furnace Creek	45, NE	8.0	7.5	0.07	0.05	0.05	0.03
Death Valley West	18, NE	7.2	6.75	0.14	0.11	0.09	0.07
Death Valley Central/South	22, E	7.75	7.0	0.16	0.10	0.11	0.07
Owl Lake	28, SE	6.6	6.0	0.07	0.05	0.05	0.03
Garlock, Mule Spring, Leach Lake	25, S	7.75	7.5	0.14	0.12	0.09	0.08
Blackwater	36, SW	7.0	6.0	0.04	0.03	0.03	0.02
Harper, Gravel Hill	48, SW	7.0	6.5	0.04	0.03	0.03	0.02
Lockhart	56, SW	7.3	7.0	0.04	0.03	0.03	0.02
Little Lake, Airport	32, W	7.0	6.5	0.07	0.05	0.05	0.03
Sierra Nevada	40, W	7.75	7.0	0.07	0.05	0.05	0.03
Ash Lake	4, W	6.8	6.5	0.40	0.31	0.27	0.20
Saline/Panamint Valley North	23, NW	7.25	6.75	0.12	0.09	0.08	0.06
Panamint Valley South	0	7.1	6.7[5]	0.59	0.51	0.40	0.34

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(1) The MCE is the largest possible earthquake based on the known tectonic framework of a particular fault. MCE magnitudes after Maulchin and Jones (1992) and Wesnousky (1986). Larger magnitude of the two sources is shown.
(2) The MPE is the largest earthquake with a return period of 100 years.
(3) Peak accelerations calculated from deterministic empirical data after Joyner and Fumal (1986). g = Acceleration of gravity.
(4) The highest horizontal accelerations that are generally sustained for a period of time during an earthquake. High repeatable accelerations are typically about 65 percent of the peak horizontal acceleration.
(5) Local segment 20 miles long (Hall to Coyote Canyons), strike-slip displacement, empirically calculated after Slemmons (1977).

Sierra Nevada Range front. This is a very active zone of earthquake activity and surface fault rupture. One of the largest historic earthquakes in the western United States occurred along the Sierra Nevada fault in 1872. The fault ruptured along a 60-mile long zone and produced an M7.8 earthquake. The epicenter was located near the town of Independence, California which is approximately 80 miles northwest of the Briggs Project site. Substantial damage to structures and loss of life were reported. Minor damage was reported to distances of 300 miles from the epicenter.

3. Another region of relatively high seismicity is the Indian Wells Valley area located about 25 miles to the west of the site. Several local fault zones in the valley have generated moderate sized earthquakes since 1900 and average about M5.0 every 20 years. Between April 1981 and April 1983, more than 5,000 events (maximum M5.2) occurred south of the Coso volcanic range in the vicinity of the Airport and Little Lake fault zones. The Airport fault activity appears to be driven by volcanic forces associated with the Coso volcanic field. The Little Lake fault is most likely connected with the Owens Valley basin faults.

4. The closest, moderate sized earthquakes to the site occurred in a region about 11 miles east-northeast, within the central part of the Panamint Range. Two events of M6.5 and M5.5 occurred at approximately the same location on November 4, 1908, and November 10, 1916, respectively. There were no reports of damage and these events have not been assigned to any known active surface fault.

5. In June 1992, the most recent major earthquake (M7.5) in the southern California desert area occurred near the town of Landers. The epicenter was located about 125 miles to the south of the site and caused 50 miles of accumulated surface rupture on four previously mapped active faults. The faults that ruptured were closely related to each other and lie within the Mojave Desert regional fault system. The desert faults trend to the north and northwest and extend as far north as the east-west trending Garlock fault zone. Figure 3.2.5 shows the Mojave Desert faults that lie within a 60-mile radius of the site.

6. The southern Panamint Valley fault located immediately adjacent to the proposed Briggs Project facilities would be capable of causing the highest degree of local ground shaking, should it rupture near the Briggs property. Other more distant active faults listed in Table 3.2.1 may cause strong ground motions at the site, but not to the degree of the nearby southern Panamint Valley fault. This fault has been assigned a MCE of M7.1 (Wesnousky, 1986) and MPE of M6.7. The MPE was determined using empirical data after Slemmons (1977). In a

worst-case scenario, a 20-mile long segment of the fault (traversing from Hall to Coyote Canyon) could rupture and displace the ground surface 6 feet with dominant right lateral displacement (Slemmons, 1977).

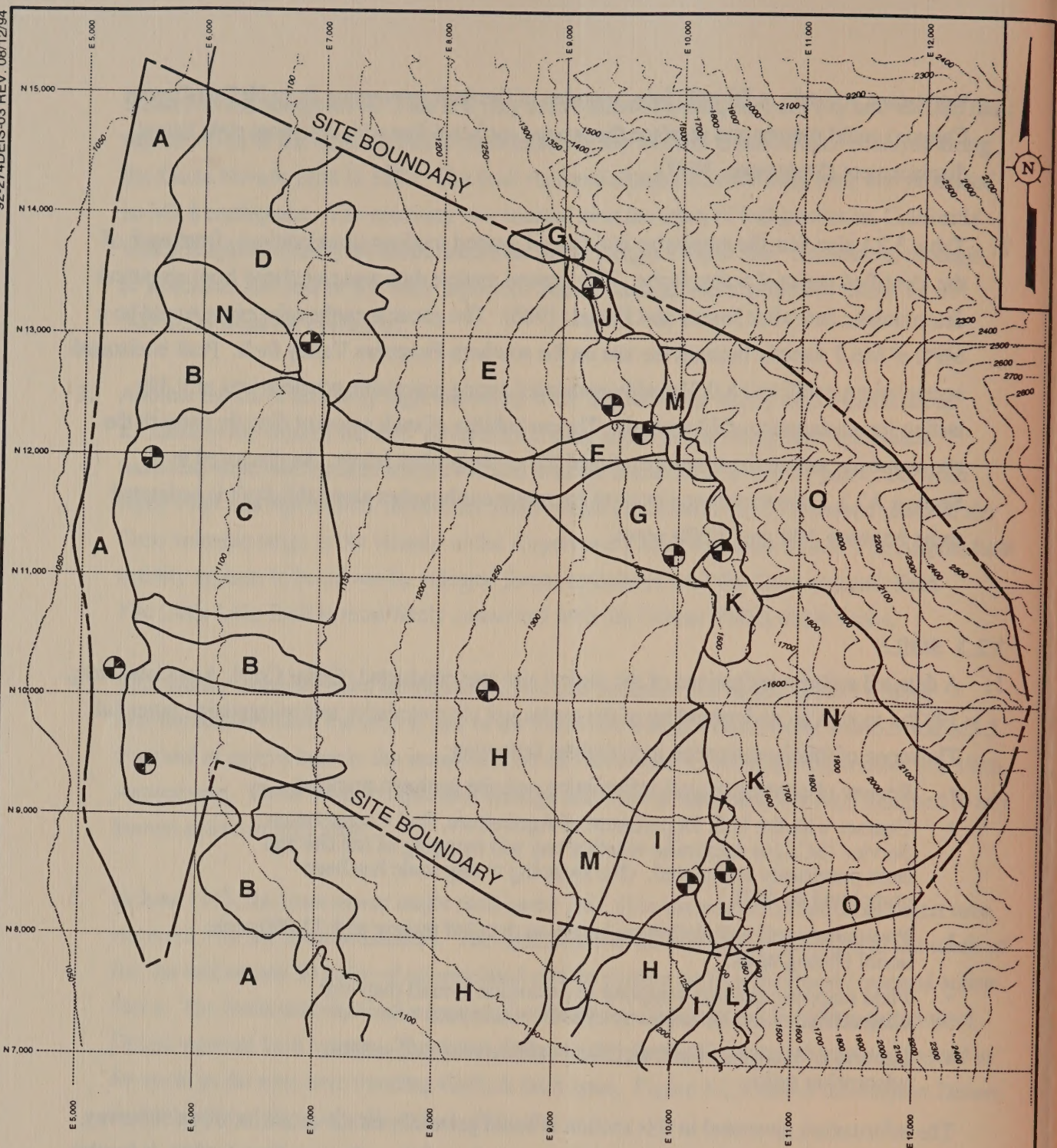
7. Table 3.2.1 also lists the respective anticipated ground motions (accelerations) from each of the identified regional active faults. This ground motion data was calculated from empirical deterministic data after Joyner and Fumal (1986). The greatest earthquake event would be a MPE of M6.7 directly beneath the site on the southern Panamint Valley fault. Peak horizontal accelerations could reach 0.51g with associated strong repeatable accelerations of 0.34g lasting for a minimum of 22 seconds. The probability of such an event directly beneath the site occurring within the short operational life of the project is low. As discussed in Section 3.2.2.3, the recurrence interval for major earthquakes along this fault is estimated to be between 500 and 2,000 years.

3.2.3 SOILS

1. A detailed soils investigations of the project site was conducted (Cedar Creek Associates, Inc., 1993b), to gain an understanding of the onsite soil characteristics and revegetation potential. The scope of this investigation included the following:
   - Review of existing project information and site geologic mapping.
   - Contact with the U.S. Department of Agriculture, Soil Conservation Service (SCS) to determine whether any soil mapping of the site had been previously completed. (No mapping at any scale has been completed by SCS.)
   - Preliminary soil unit definition based on detailed review of 1:12,000 scale aerial photographs.
   - Field mapping and soil sampling to determine overall map unit characteristics and descriptions of soils within each unit.
   - Laboratory analysis of pH, electrical conductivity and sodium adsorption ratio.

   The information presented in this section is based primarily on the results of this soil survey. The supporting report, *Soils Technical Memorandum, Briggs Project,* March 1993, is hereby incorporated by reference.

2. A total of 15 map units, designated as "A" through "O," have been defined within the project area as shown in Figure 3.2.8. Key characteristics dominant in those soil map units are summarized in Table 3.2.2.



0 1200 2400 FEET
SCALE

LEGEND

A SOIL MAP UNIT (SEE TABLE 3.2.2)

SOIL MAP UNIT BOUNDARY

SOIL SAMPLE SITE

SOURCE: CEDAR CREEK ASSOCIATES, INC., 1993b.

FIGURE 3.2.8

SOILS MAP

BRIGGS PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

TABLE 3.2.2

SUMMARY OF KEY SOIL CHARACTERISTICS

MAP UNIT	LOCATION	DEPTH (inches)	TEXTURE[1]	COARSE FRAGMENT CONTENT[2]	pH	EFFERVESCENT WITH HCL[3]	ELECTRICAL CONDUCTIVITY[4]	SAR[5]	PERMEABILITY	PERCENT OF MAP UNIT[6]	INCLUSION DESCRIPTION
A	Playa Border	0-10 10-29 29-60+	lsgr lsvgr ls-slxst	25 45-60 10-75	8.0-8.3 7.8 7.9-8.3	es-e es-e es-e	0.4-2.5 2.8-4.0 8.5-11.9	0.3-0.5 0.8-5.2 21.1-40.8	Rapid	85	15% inclusion of deep highly saline soils.
B	Alluvial Fan	0-8 8-15 15-60+	lsgr lsvgr lsvgr-slvgr	25-30 40 25-60	8.3-8.5 8.3 8.0-8.3	es-e es es-e	0.3 0.7 4.4-9.5	0.7-0.8 1.8 10.4-35.2	Rapid	95	5% eroded gullies lacking surface soil horizons.
C	Faulted Zone	0-3 3-8 8-60+	scvgr scvgr slxgr-sclxgr	40 50 70-80	8.0 7.9 7.4-7.7	ev ev ev	43.2 76.5 53.5-115.9	137.7 141.0 >71.0	Very Slow	70	25% similar to Map Unit H. 5% erosion gullies lacking surface soil horizons.
D	Faulted Zone	0-3 3-12 12-45	scgr scvgr sclxgr-sclxst	20 60 90-95+	8.3 7.7 7.5-7.6	ev ev ev	25.4 59.7 55.8-98.2	153.7 105.5 >72.0	Very Slow	65	25% similar soils differentiated by vegetation. 10% desert pavement.
E	Alluvial Fan	0-2 2-21 21-35 35-60+	scvgr lsxgr-lsxco lsvgr-lsxco sclxco	45 65-70 60-75 80	8.1 7.9-8.1 8.1 8.1	es es-ev es-e es	1.4 1.9-4.1 4.3-4.5 5.6	5.8 1.1-5.2 6.8-10.2 18.4	Slow	70	25% deep gullies with large cobbles and stones. 5% other soils without gravels or cobbles in the upper 24 inches.
F	Alluvial Fan	0-9 9-48 48-60+	svgr sxgr-lsxgr svgr	50-60 70 50	8.1-8.5 8.3-8.4 8.7	e e e	0.6 0.9-1.2 0.7	1.9-2.1 2.4-3.5 2.3	Rapid	100	None.
G	Alluvial Fan	0-2 2-5 5-32 32-60+	slgr slvgr lsxst-slxgr svgr-lsvgr	30 50 75-85 60	8.3 7.7 8.4-9.0 9.3-9.4	e e e-ev e-ev	1.5 2.1 1.8-3.9 2.1-2.5	1.7 1.9 8.4-16.1 23.5-35.4	Moderately Rapid	70	20% gullies. 10% similar to Map Unit H.
H	Alluvial Fan	0-3 3-19 19-41 41-60+	slvgr slvgr-sclvgr lsxgr-slxgr lsxgr	50 50-60 65 90	7.9 7.9-8.5 8.3-8.9 8.0-8.3	ev ev ev e	2.1 2.2 3.2-17.9 18.3	4.2 25.1 43.4-52.2 44.9	Moderately Rapid to Rapid	70	30% gullies with rock and rubble.
I	Alluvial Fan	0-11 11-24 24-31 31-60+	sxgr-lsxgr lsxco slgr sclxgr	70 80 20 75	8.2-8.3 8.4 8.6 8.2	e e e e	0.9-1.0 0.8 1.2 7.8	1.9-4.1 3.6 16.4 25.3	Moderate to Moderately Rapid	80	20% gullies lacking surface soils.
J	Mountain Front	0-2 2-15 15+	slvgr slxgr-slxco auger refusal	60 75-80 –	8.3 8.2-8.4 –	e ev –	0.4 0.5-0.6 –	1.3 2.7-4.9 –	Moderate to Moderately Rapid	55	20% shallow soils on extremely steep slopes. 10% gullies with rock/rubble accumulations. 10% bedrock. 5% other soils.
K	Mountain Front	0-10 10-24 24-60+	slvgr-sclxgr sclxgr slvgr-slxco	60-65 65 50-75	8.1-8.3 8.6 8.4-8.6	es-e e es	0.4-0.7 3.9 12.0-15.8	2.2-4.6 40.3 >59.0	Moderate to Moderately Rapid	65	20% shallow soil. 15% rock/rubble.
L	Mountain Front	0-2 2-10 10+	slxgr slxco slightly weathered hard bedrock	80 75 –	8.2 8.3 –	e ev –	0.6 0.4 –	1.5 1.4 –	Moderately Rapid to Rapid	70	30% talus, rock outcrop, rubble and gullies.
M	Severely Eroded Areas	–	–	–	–	–	–	–	–	90	10% bedrock.
N[7]	Disturbed Area	–	–	–	–	–	–	–	–	100	–
O[7]	Mountains	–	rock/rubble accumulations	–	–	–	–	–	Moderate to Moderately Rapid	60 to 75	15-20% rock outcrop. 10 to 20% shallow and very shallow soils.

92-274 (8/12/94/lk)

Source: Modified from Cedar Creek Associates, Inc., 1993b.

(1) Modifiers: gr = gravely, vgr = very gravely, xgr = extremely gravely, xco = extremely cobbly, xst = extremely stony.
Textures: s = sand, ls = loamy sand, sl = sandy loam, scl = sandy clay loam, sc = sandy clay.

(2) Number indicates all coarse fragments including gravels, cobbles, stones, and boulders (percent by volume).

(3) HCL = hydrochloric acid. es = slightly effervescent, e = moderately effervescent, ev = violently effervescent.

(4) Electrical conductivity (EC) in mmhos/cm.

(5) Sodium adsorption ratio (SAR).

(6) Percent of map unit represented by the soil characteristics described. The remaining area of the map unit consists of "inclusions."

(7) Units N and O were not mapped in detail or sampled because these areas are considered too steep for safe and efficient soil salvage operations.

3. In general, the soils on the site include sandy clay, sandy clay loam, sandy loam, loamy sand and sand. All are gravely to extremely stony. The coarse fragment content ranges from about 10 to 95 percent. Subsurface horizons exhibiting over 50 to 60 percent rock fragments by volume are the norm, and rock fragments typically overlie 80 to 100 percent of the surface of most soil map units. The soils are moderately alkaline with pHs ranging from about 7.4 to over 9.0, with pH values between 7.8 and 8.6 being most common.

4. A primary focus of the soils investigation was to determine suitability of soils for reclamation. Guidelines established to determine soil salvage suitability are provided in Table 3.2.3. Results of the soil salvage suitability evaluation are summarized in Table 3.2.4.

TABLE 3.2.3

SALVAGE SUITABILITY GUIDELINES

PARAMETER	SUITABILITY FOR SALVAGE		
	Good	Fair	Poor
pH	5.5-8.5	5.0-5.5 8.5 - 9.0	<5.0 >9.0
Texture[1]	sl	ls, scl	s, sc
Coarse Fragments (% volume)	<25	25-35	>35
Effervescence	es, e	--	ev
Electrical Conductivity (EC)	<4	4-8	>8
Sodium Adsorption Ratio (SAR)[2]	<6	6-12	>12

92-274 (8/17/94/lk)

Source: Cedar Creek Associates, Inc., 1993b.

(1) Textures: s = sand, ls = loamy sand, sl = sandy loam, scl = sandy clay loam, sc = sandy clay.
(2) Specific thresholds may vary according to clay mineralogy, soil texture, and organic matter content.

TABLE 3.2.4

SUMMARY OF SOIL SALVAGE SUITABILITY EVALUATION

MAP UNIT	SALVAGE DEPTH (inches)	PERCENT OF UNIT SALVAGEABLE	PRIMARY SALVAGE LIMITATIONS
A	29	85	Rock fragment content, EC, SAR
B	15	95	SAR, EC, rock fragment content
C	3-19(1)	25	SAR, EC, rock fragment content
D	18	25	Rock fragment content, SAR
E	26(2)	75	Rock fragment content
F	60(2)	100	Rock fragment content, texture
G	32(2)	80	SAR, texture, pH
H	3-19(1)	70	SAR, EC, rock fragment content
I	31(2)	80	SAR, EC, rock fragment content
J	0	0	Slope, topography, rock fragment content
K	0	0	~~SAR,~~ EC, rock fragment content, opportunistic salvage only
L	0	0	Coarse fragment content, depth to bedrock
M	0	0	Severely eroded, opportunistic salvage only
N	0	0	Disturbed area, opportunistic salvage only
O	0	0	Slope, topography, rock outcrops

92-274 (4/28/95/dh)

(1) The horizon between 3 and 19 inches deep is considered marginally suitable due to SAR.
(2) Considered marginally suitable due to high percentage of coarse rock material.

Source: Cedar Creek Associates, Inc., 1993b.

3.3 WATER RESOURCES

1. This section discusses the hydrogeologic and surface water characteristics of the site region and vicinity. The potential impacts that could occur due to project implementation are discussed in Section 4.3. Information in this section is based primarily on published references and the following hydrologic-related studies conducted for the Briggs Project:

   - *Ground Water Supply Study, Briggs Project* (Hydro-Geo Consultants, Inc., 1993a).
   - *Pumping Test Evaluation, Monitoring Well MW-2, Briggs Project* (Hydro-Geo Consultants, Inc., 1993b).
   - *Feasibility Level Design Report, Briggs Project* (WESTEC, Inc., 1993a).
   - *Feasibility Level Design Report for Surface Hydrology and Storm Water Controls, Briggs Project* (WESTEC, Inc., 1993b).
   - *Canyon Resources Corporation, Briggs Cecil R. and Jackson Claimblocks Biological Surveys* (JBR Consultants Group, 1991).
   - *Briggs Project Report of Waste Discharge* (WESTEC, Inc., 1993c).

   These studies are hereby incorporated by reference. Other references used in the preparation of this section are specifically cited, where appropriate.

3.3.1 REGIONAL SETTING

3.3.1.1 Regional Surface Water Occurrence

1. Panamint Valley is an elongated northwest trending valley that is about 70 miles long. The alluvial basin within the valley floor is continuous for the length of the valley and is up to 12 miles wide (Figure 3.3.1). The surface water flow from Darwin Valley, adjacent to the northwestern rim of the Panamint Valley (Figure 3.3.1), drains to the Panamint Valley. However, the Argus Range located between the two valleys most likely inhibits ground water flow into Panamint Valley from this area. Pilot Knob Valley located to the south, is hydrologically connected to Panamint Valley. Both surface water and ground water flow from Pilot Knob to the Panamint Valley. The Panamint, Darwin and Pilot Knob basins represent a closed surface drainage system with the topographic low located at the southern portion of the Panamint Valley floor, forming the playa discussed in Section 3.2.1. The watershed of the basin is about 1,700 square miles.

2. The climate in the valley is dry, with an average annual rainfall of less than 4 inches near the valley floor. At higher elevations, the rainfall increases. Evaporation substantially exceeds the available precipitation. Pan evaporation is estimated at about 150 inches. The surface drainages in the region flow intermittently in response to infrequent precipitation events that are large enough to result in runoff. The only perennial surface waters are several small springs that occur in canyons or at the foot of the mountains that surround the valley.

3. The mountains consist of rock that is generally much less permeable than the alluvial deposits in the bottom of the valley. Some of the precipitation that falls onto the mountains and alluvium infiltrates. The majority of the precipitation evaporates or runs off to the valley floor and evaporates and infiltrates in the playa area.

4. Minor rains and subsequent runoff generally evaporate or are absorbed by the desert vegetation before substantial downward percolation can occur. Only larger rains contribute to ground water recharge. Large precipitation events can also cause water to accumulate in the playa until it evaporates and infiltrates. Water can remain on portions of the playa for several months during cooler parts of the year.

3.3.1.2 Regional Ground Water Occurrence

1. The mountains surrounding the valley are primarily composed of igneous and metamorphic rocks of relatively low permeability. Although water is present in joints and fractures, those rocks are generally not capable of transmitting large quantities of water. The water that is present is the result of recharge by the small amount of infiltration that occurs due to the infrequent precipitation events. The general low permeability of the rock comprising the mountains causes the ground water to mound up, close to the surface, which in turn results in the occurrence of springs at elevations far above the valley floors. Ground water in the western flank of the Panamint Range gradually migrates to the Panamint Valley, while that in the eastern flank migrates toward Death Valley. The low permeability rocks inhibit downward infiltration and cause springs where the piezometric surface (water pressure surface) intersects the ground (see Figure 3.3.2).

2. In contrast to the low permeability rock comprising the mountains, the alluvial deposits of Panamint Valley represent a large ground water reservoir. The water in the valley is stored in the intergranular spaces of the sediment and is easily recoverable. The alluvium consist of horizontally layered thin to thick beds and lenses of gravel, sand, silt, clay and combinations of these materials. The saturated thickness of the alluvium is estimated to be in excess of 2,000 feet. The playa area occurs at the low portion of the alluvium. It generally incorporates fine-grained materials such as clays and silts, and includes beds of evaporite salts, with interbedded sand and gravel.

3. As further discussed in Section 3.3.2, the ground water table occurs at shallow depths beneath the playa area. At a government test well drilled in 1953 (23S/44E-3N1) located

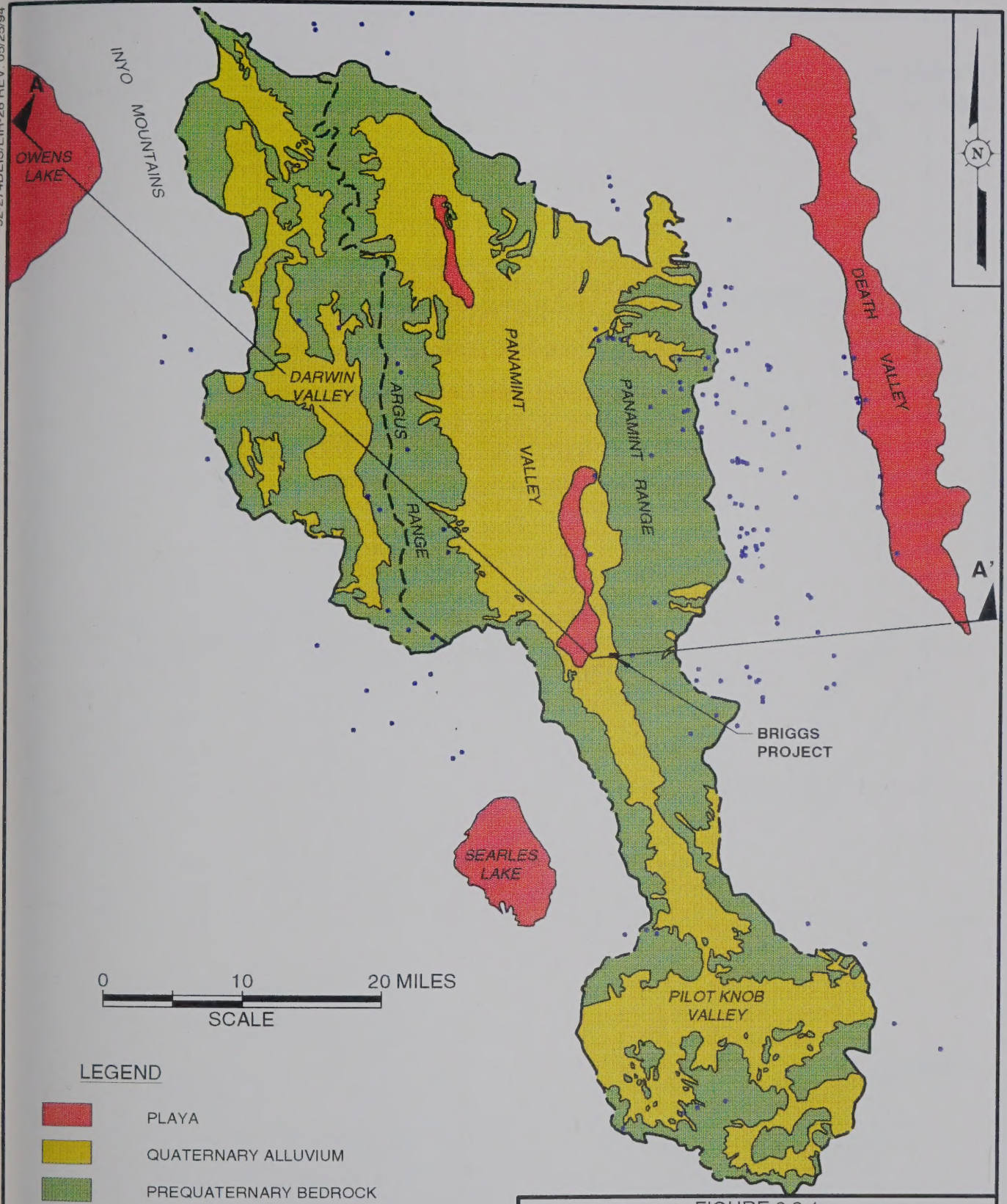
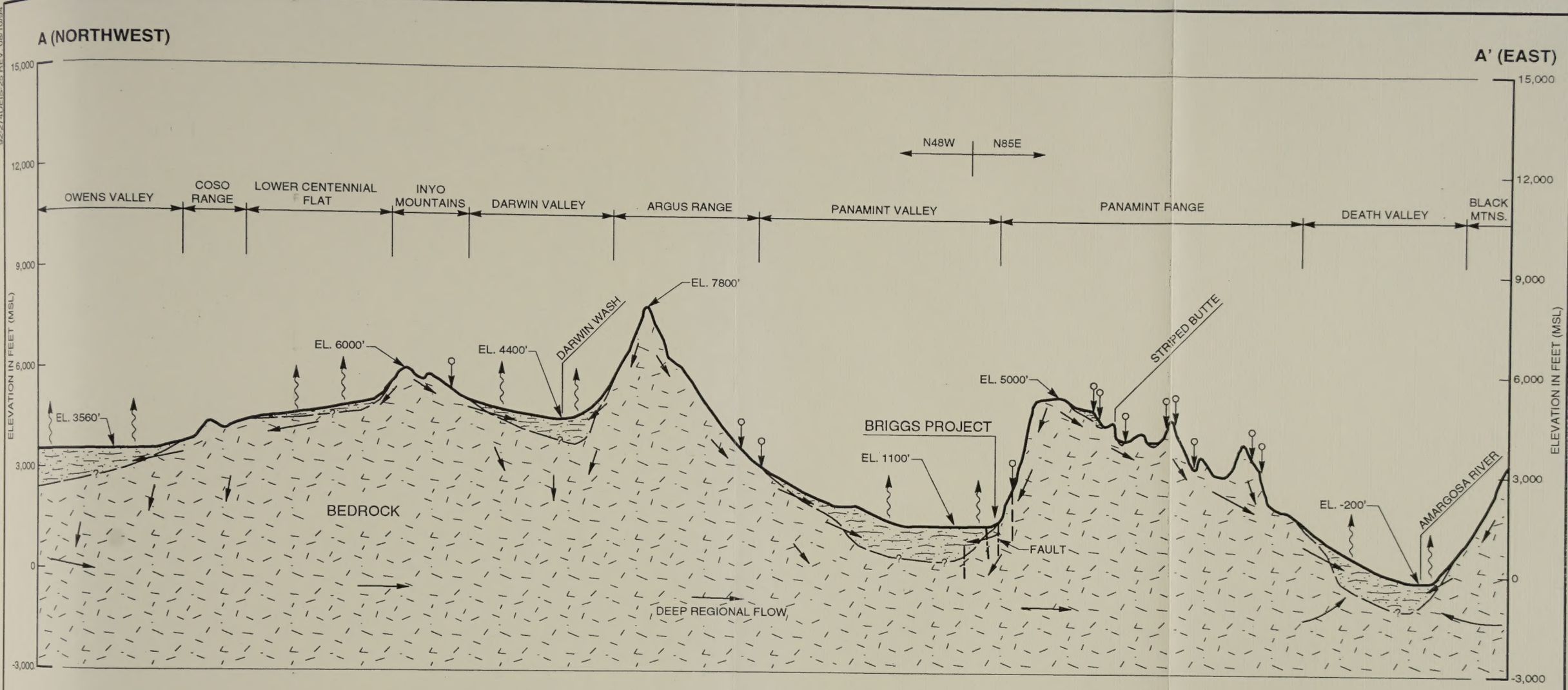


FIGURE 3.3.1

PANAMINT VALLEY DRAINAGE BASIN

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NOTE: SEE FIGURE 3.3.1 FOR CROSS SECTION LOCATION.

LEGEND

- LOCATION OF SPRINGS
- PREQUATERNARY BEDROCK
- ALLUVIUM AND PLAYA DEPOSITS (UNDIFFERENTIATED)
- GROUND WATER FLOW DIRECTION (CONCEPTUAL)
- EVAPORATION

0 6 12 MILES

HORIZONTAL SCALE
(VERTICAL SCALE EXAGGERATED
APPROXIMATELY 10 TIMES)

FIGURE 3.3.2

REGIONAL HYDROLOGIC CROSS SECTION A-A' LOOKING NORTHWARD

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about one mile west of the site area (Figure 3.2.2), the depth to ground water beneath the playa varied from 10.8 to 12.6 feet below the ground surface over a 14-year period (Hydro-Geo Consultants, Inc., 1993a). The elevation of ground water within the alluvial fans around the basin perimeter is similar to the elevation of the ground water below the playa surface. There is only a very minor gradient from the basin borders to the central portion of the basin. The depth of the shallow ground water varies seasonally and with location. After wet seasons, surface seepage occurs at the toe of some alluvial fans at canyons that have a large watershed. An example is Post Office Spring near Ballarat. Within several hundred feet of the ground surface, ground water is considered unconfined.

4. Ground water recharge to the Panamint Valley alluvium occurs from both rainfall infiltration and from underflow into the basin from the adjacent valleys to the west and northwest (Koehler and Ballog, Jr., 1979). An order of magnitude estimate of recharge to Panamint basin indicates that an average of between 25,000 and 30,000 acre-feet could infiltrate from rainfall annually. This recharge would gradually migrate towards the Panamint Valley playa where it would ultimately evaporate. Some of the recharge may also contribute to the deeper regional flow to the east (Figure 3.3.2). As discussed in Section 3.3.1.3, ground water use within the basin is minimal.

5. The amount of ground water that is stored within the basin is large. In a 1975 DWR publication, basin storage was estimated to be about 3.4 million acre-feet (DWR, 1975). Another study conducted by the DWR (Koehler and Ballog, Jr., 1979) estimated that the Panamint Valley basin could hold a minimum of 6 million acre-feet of stored ground water with a saturated thickness of 400 feet and a specific yield of 7 percent.

3.3.1.3 Regional Water Use

1. Water use in the Panamint Valley is primarily limited to diversion of surface water from numerous small springs and drainages that have runoff after rainstorms. A review of SWRCB records conducted in January 1994 indicates that appropriated surface waters in Panamint Valley total about 750 acre-feet per year (about 465 gpm). Permitted uses for this water include mining, milling, power generation, domestic uses, wildlife protection/habitat enhancement, and recreation. The points of diversion are primarily located in the Panamint Range and Argus Range from about 6 to 30 miles north and northwest of the Briggs Project site.

2. Very few wells have been drilled in the basin. Only limited pumping of ground water occurs in the project region from several wells located over seven miles from the project site near Ballarat.

3. The Basin Plan for RWQCB management of water resources in the Panamint Valley includes municipal and industrial supply and industrial service as designated beneficial uses of ground water; and municipal and domestic supply, industrial service, ground water recharge, water contact recreation, noncontact water recreation, warm freshwater habitat, cold freshwater habitat, and wildlife habitat as designated beneficial uses of surface water. The RWQCB has designated almost all saline and alkaline desert waters of the Lahontan Region as municipal with recognition that, in areas where water is scarce, even poor quality water may eventually be desirable for treatment and use. The RWQCB has indicated that the Basin Plan was recently revised with more specific beneficial use designations, but the revised plan is not yet available. During development of this EIS/EIR, consultation with the RWQCB occurred that considered the revised plan.

3.3.1.4 Regional Water Quality

1. In general, water quality is best in the mountain ranges and at margins of the basin adjacent to the ranges, and becomes progressively higher in dissolved solids and other constituents toward the playas. The water quality also appears to deteriorate with depth below the playa surface due to beds of soluble evaporite deposits. In 1953, a well (23S/44E-3N1) was drilled on the playa about two miles northwest of the project site. The TDS in water samples collected were 272,000 mg/L. The well log indicated numerous evaporite beds of halite, gypsum, and calcite. The TDS of the wells in the alluvium at the project site is high ranging from about 7,000 to 10,000 mg/L. The water quality of the Redlands Spring in the mountain range is good with a TDS of approximately 950 mg/L.

3.3.2 SITE VICINITY

3.3.2.1 Surface Water Occurrence

1. The primary surface water drainage in the site vicinity is Redlands Canyon, a deeply incised narrow, V-shaped canyon that drains an approximately six-square mile watershed area (3,800 acres). The Briggs Project is situated at the mouth of this canyon (Figure 3.2.2). Other drainages that emanate from the mountain slopes in the immediate project vicinity are unnamed and have relatively small watersheds ranging from about 80 to 300 acres.

2. As for the overall project region, surface water flows in the site vicinity occur primarily in response to infrequent precipitation events. Even when precipitation does occur, water from smaller events may infiltrate into the shallow dry surface soils and bedrock, and/or evaporate without resulting in runoff.

3. The only perennial surface water in the site vicinity is Redlands Spring, located on the floor of Redlands Canyon at an elevation of about 2,550 feet above MSL, about one-half mile east (upgradient) of the project site. Canyon has been monitoring flows at Redlands Spring since early 1993. Following the above-average precipitation during the winter of 1992-1993, flows of up to 50 to 60 gpm occurred. By December of 1993, flow from the spring reduced to about 30 gpm. The water issues from fractures in the basement rock, but quickly infiltrates into the shallow stream alluvium and back into the rock fractures downgradient of the spring location.

4. Although not perennial, surface water can occur on parts of the playa west of the site for several weeks to months in the cooler part of the year, following substantial precipitation events. Infiltration in the playa area is minimal because of the fine-grain soils and shallow water table. Water collecting on the playa is primarily lost through evaporation resulting in a buildup of alkali salts on the playa surface. Because of this condition, surface water at the playa, when present, would be expected to be of poor quality with a high TDS.

5. Wetlands do not occur on the project site (JBR, 1991). However, areas defined as wetlands subject to jurisdiction of the COE do occur at the edge of the playa in the project vicinity. The limited wetlands that are present are of low value as further discussed in Section 3.4. The reasons that these wetlands are considered to be of low value include the lack of surface water and low bioproductivity. The wetland areas contain low plant species diversity, with very little difference in vegetation from the surrounding areas. The wetlands do not provide aquatic habitat or important functions related to flood attenuation, influence on water quality or water circulation patterns, or other ecological characteristics commonly associated with wetlands.

6. Perennial springs occur at the margin of the playa near Ballarat. The closest of these occurs more than four miles from the project site and is beyond the area that could be impacted by pumping for the project water supply. The area of influence of ground water pumping impacts is discussed in Section 4.3.

7. Surface seepage occurs intermittently at the toe of some alluvial fans in the vicinity following substantial amounts of precipitation. The closest area where this is known to occur is located

about one mile north of the project site at the western edge of the alluvial fan at the mouth of Big Horn Canyon. Surface seepage has not been observed at the Redlands Canyon alluvial fan where the project is located.

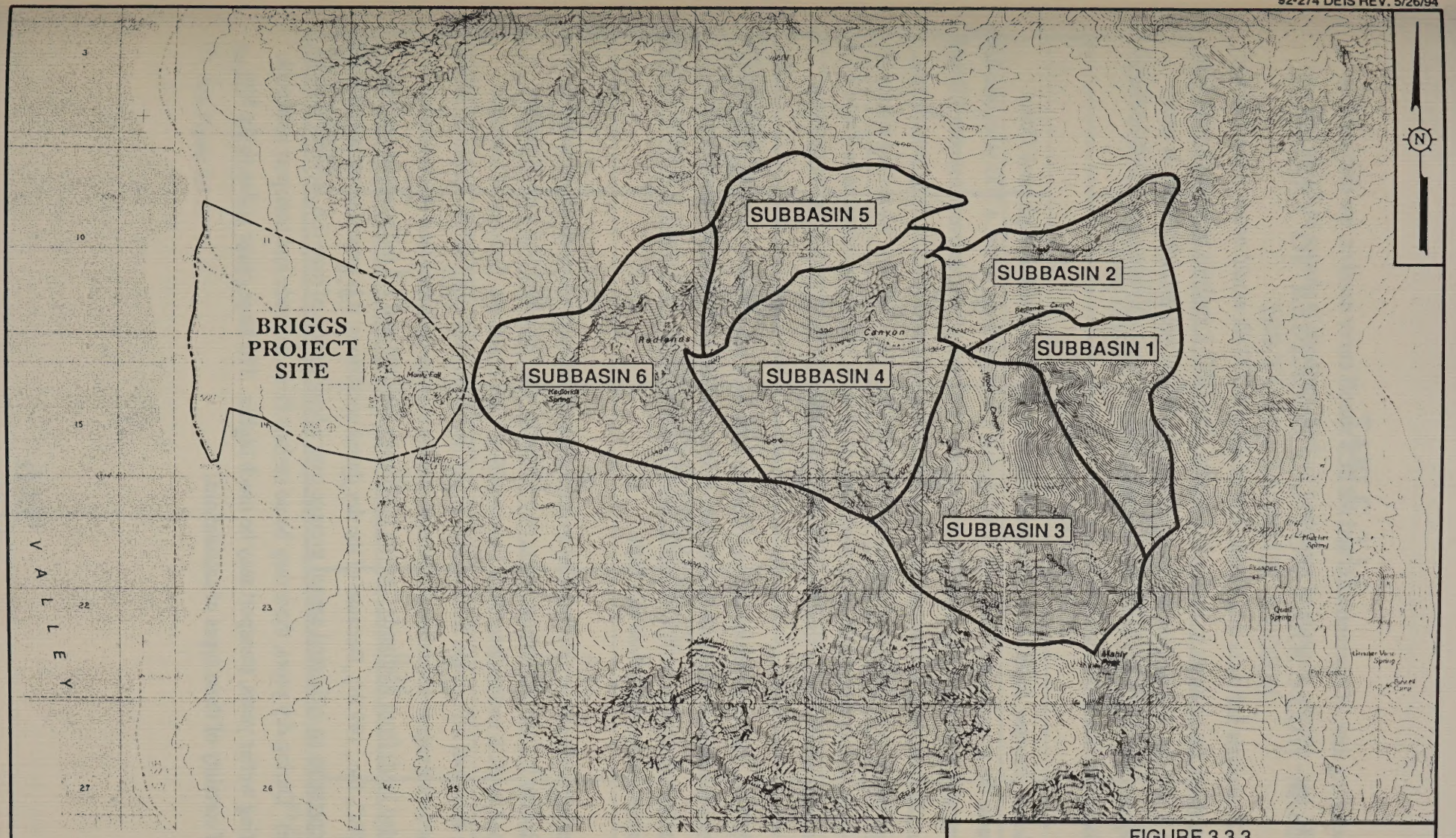
3.3.2.2 Redlands Canyon Drainage

1. As discussed in Section 2.2.2.5.3, surface flow from Redlands Canyon onto the project area occurs infrequently. Based on Canyon's observations which have indicated that no surface flow has occurred at the mine site since 1987, including the wetter than average year of 1992 to 1993, it may typically be several years or more between surface flow events from Redlands Canyon. Based on precipitation data collected at the site from 1992 to 1993, it appears that a rainfall event of greater than 1 inch per day is required to generate runoff. During the infrequent occasions when such substantive precipitation occurs, the constricted width and steep gradient of the Redlands Canyon drainage can result in large concentrated flood flows. These flows dissipate quickly, lasting from minutes to hours. Such flash floods can carry large sediment loads, including boulders up to several feet in diameter. These sediments are dropped out quickly at the foot of the mountains where the drainage becomes unconstricted and less steep.

2. Over time, these occasional surface flow events have built up the well-developed radially shaped alluvial fan at the mouth of the canyon. The drainage path over the top of the fan consists of a network of shallow braided channels that become active in response to varying surface flow rates during individual runoff occurrences and channel blockage due to alluvial deposition. The primary drainage path over the fan surface is currently toward the southwest.

3. Engineering feasibility studies for the Briggs Project (WESTEC, Inc., 1993a; 1993b) included evaluation of historic precipitation data from the Earthinfo's National Climatic Data Center (NCDC) and the 1973 National Oceanic and Atmospheric Administration's (NOAA) *Precipitation Frequency Atlas* of the Western United States. Based on the NOAA atlas, the 100-year, 24-hour design storm for the Redlands Canyon watershed was estimated to be 5.3 inches.

4. In order to develop designs for Redlands Canyon drainage control, the peak discharge that would be expected to occur from Redlands Canyon as a result of the design storm was calculated by two methods: The *HEC-1* computer model developed by the COE and the *TR-20* computer assisted model developed by the SCS. For the modeling, the watershed area was divided into six subbasins as shown in Figure 3.3.3. Details of the modeling and derivation of pertinent



SOURCE: WESTEC, INC. 1993b.

REFERENCE:
USGS TOPOGRAPHIC QUADRANGLE MAPS OF MANLY FALL, CA; DATED 1988, AND MANLY PEAK, CA; DATED 1984.

FIGURE 3.3.3

REDLANDS CANYON SUBBASINS FOR DRAINAGE CALCULATIONS

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input, including time of concentration and the SCS runoff curve number, are discussed in WESTEC, Inc., 1993b. Results of modeling by both methods is shown in Table 3.3.1.

5. The TR-20 analysis indicates that a peak flow of about 9,700 cfs would occur at the drainage diversion above the mine pit in Redlands Canyon. The HEC-1 analysis indicates a peak flow of about 7,100 cfs. For project design purposes, the TR-20 results of 9,700 cfs is used. A hydrograph for the TR-20 analysis is shown in Figure 3.3.4 and indicates that flows over 1,000 cfs would last about two hours.

6. In dry desert climates, rapid short-term thunderstorms can also result in high peak flows. To evaluate the magnitude of the peak flood during a thunderstorm event, a 100-year, one-hour storm was also modeled using the HEC-1 program. This storm was derived from the 5.3-inch 100-year, 24-hour design storm and the modeled storm input was verified using procedures published by the U.S. Bureau of Reclamation (WESTEC, Inc., 1993b). Modeling results for the 100-year, 1-hour storm indicate a peak flow of about 3,300 cfs as indicated in Table 3.3.2, which is substantially lower than the peak flow generated by the 100-year, 24-hour event.

7. The WESTEC, Inc. evaluations used a relatively high SCS runoff curve number of 90 which maximizes the amount of runoff that occurs. It is equivalent to the runoff that occurs from clayey soils and shallow soils over nearly impervious material. As a result, it is likely that the runoff estimates are conservatively high.

8. Engineering studies have also included an estimation of sediment transport characteristics of the Redlands Canyon drainage using two methods: the Universal Soil Loss Equation developed by SCS and the Modified Universal Soil Loss Equation. Sources of sediment include sheet and rill erosion from upland slopes and numerous small debris chutes on slopes adjacent to drainages. Calculations estimate that the average sediment load (bedload plus suspended load) from Redlands Canyon is between 200,000 and 1.5 million tons per year (WESTEC, Inc., 1993b). Because of the dry desert conditions, it is important to note that this range represents an estimated annual average over a long period of time (i.e., several decades or more). During dry years, there may be no surface flows to erode and transport sediment, and during wetter years, transport may be much higher. The large range is due to the low level of certainty of these types of calculations.

TABLE 3.3.1

SUMMARY OF REDLANDS CANYON PEAK FLOW MODELING 100-YEAR, 24-HOUR STORM

SUBBASIN[1]	DRAINAGE AREA (square miles)	SCS CURVE NUMBER	TIME OF CONCENTRATION (hours)	PEAK RUNOFF (cfs)
TR-20 ANALYSIS RESULTS				
1	0.65	90	0.25	1,430
2	0.63	90	0.13	1,660
3	1.55	90	0.32	3,080
4	1.40	90	0.15	3,550
5	0.67	90	0.24	1,470
6	1.17	90	0.14	3,020
DIVERSION LOCATION	**6.07**	--	--	**9,670**
HEC-1 ANALYSIS RESULTS				
1	0.65	90	0.25	850
2	0.63	90	0.13	962
3	1.55	90	0.32	1,834
4	1.40	90	0.15	2,058
5	0.67	90	0.24	895
6	1.17	90	0.14	1,714
DIVERSION LOCATION	**6.07**	--	--	**7,144**

92-274 (8/12/94/lk)

Source: WESTEC, Inc., 1993b.

(1) See Figure 3.3.3.

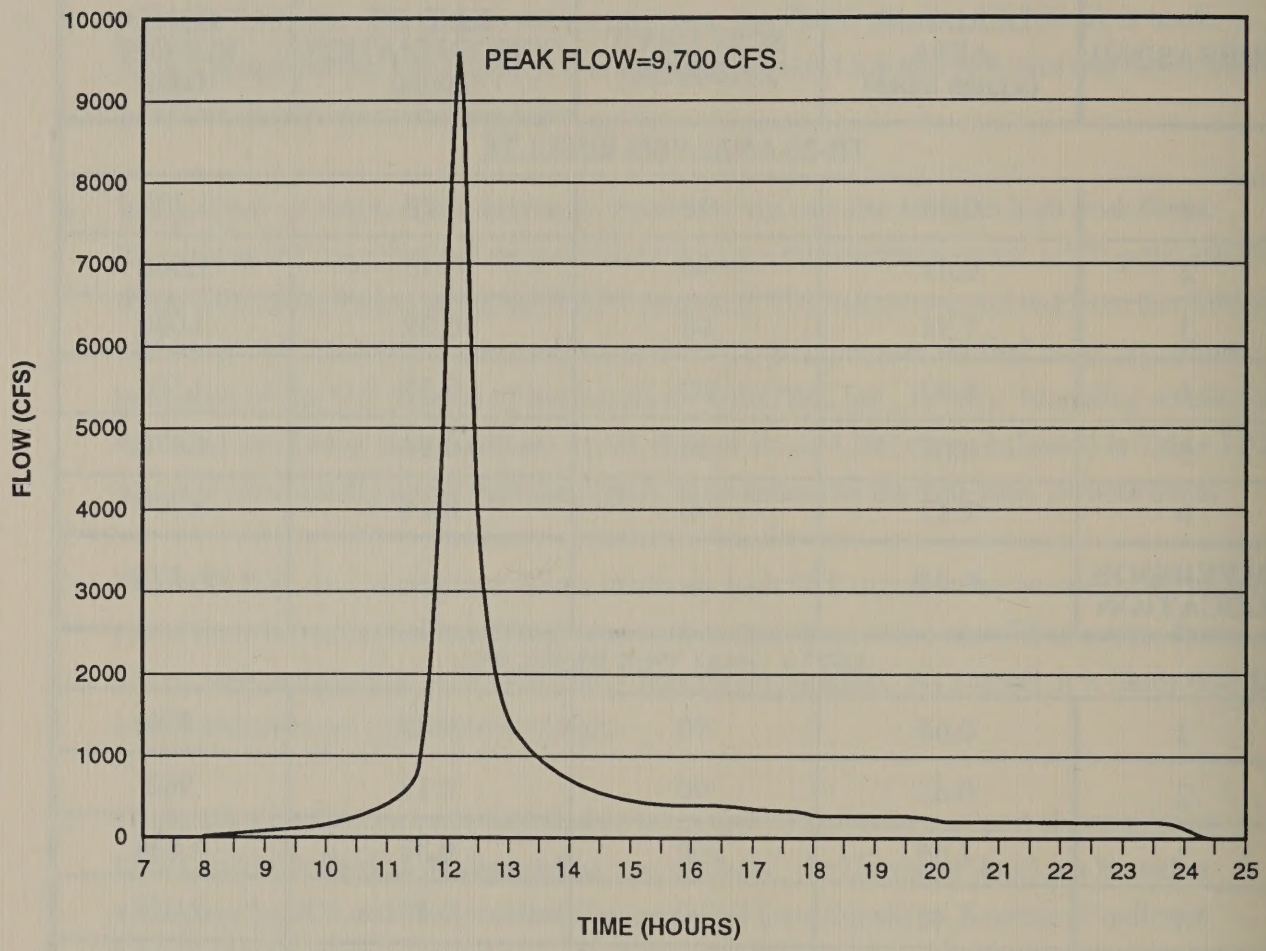


FIGURE 3.3.4

HYDROGRAPH FOR REDLANDS CANYON AT THE DIVERSION (100-YEAR, 24-HOUR STORM)

BRIGGS PROJECT

SOURCE: WESTEC, INC., 1993b.

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TABLE 3.3.2

SUMMARY OF REDLANDS CANYON PEAK FLOW MODELING 100-YEAR, 1-HOUR STORM

SUBBASIN(1)	DRAINAGE AREA (square miles)	SCS CURVE NUMBER	TIME OF CONCENTRATION (hours)	PEAK RUNOFF (cfs)
1	0.65	90	0.25	389
2	0.63	90	0.13	458
3	1.55	90	0.32	859
4	1.40	90	0.15	968
5	0.67	90	0.24	400
6	1.17	90	0.14	826
DIVERSION LOCATION	**6.07**	--	--	**3,333**

92-274 (8/12/94/lk)

Source: WESTEC, Inc., 1993b.

(1) See Figure 3.3.3.

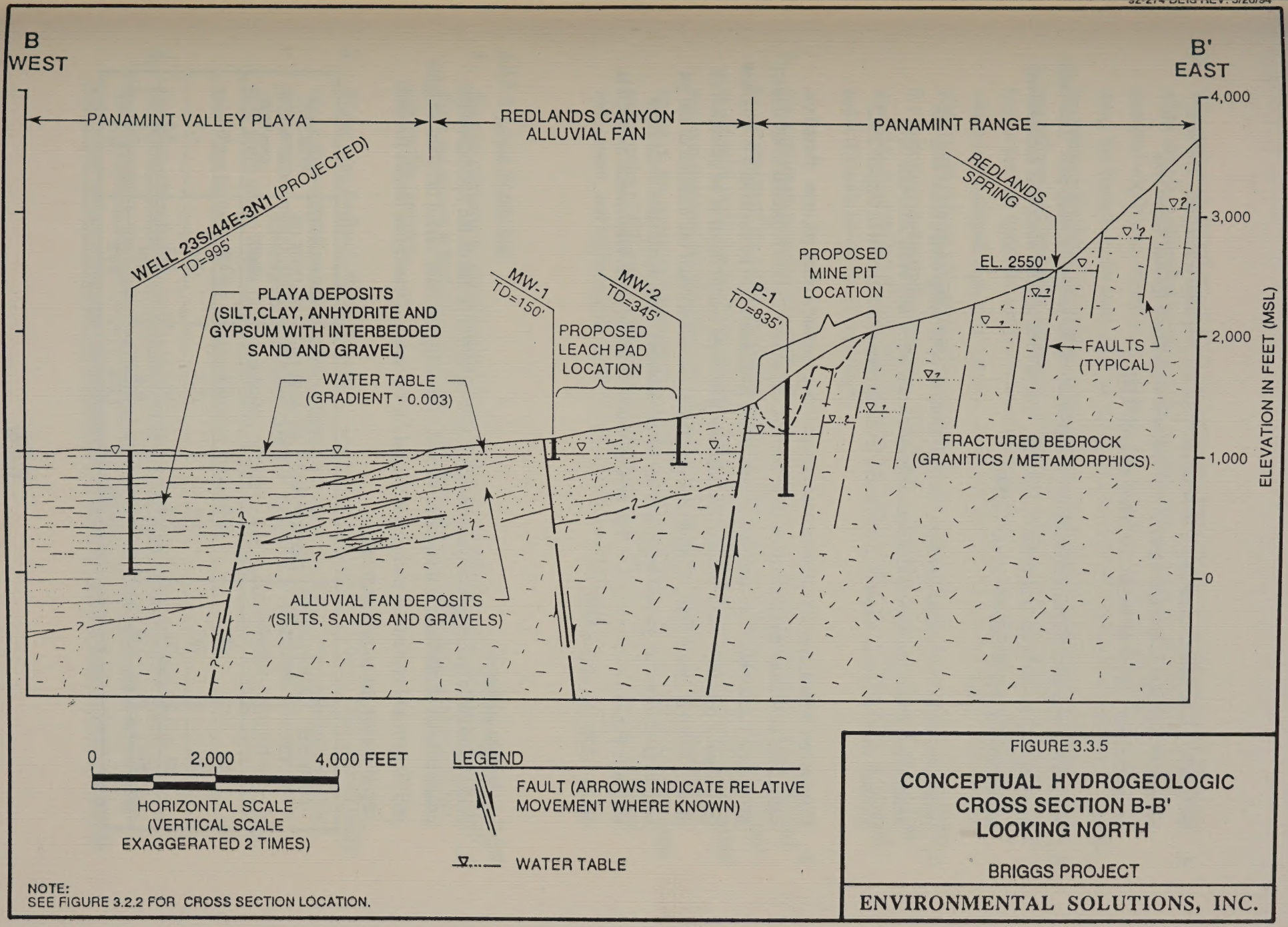
3.3.2.3 Ground Water Occurrence

1. Figure 3.3.5 provides a cross section through Redlands Spring, the project site and the playa illustrating the hydrogeology of the site vicinity. The location of the cross section is shown in Figure 3.2.2. There are two primary hydrogeologic regimes, as follows:
   - A basement rock regime where ground water occurs in joints and fractures of the granitic and metamorphic rocks.
   - A basin regime where ground water occurs in the interconnected pore spaces of the alluvial fan and playa deposits.

2. Within the basement rock regime of the upland area, the only source of recharge is the infiltration that occurs due to occasional rainfall events. Water that does not run off or evaporate infiltrates into joints and fractures and slowly works its way through the basement fractures downgradient before entering the porous media of the alluvial basin. Several mapped faults trend along the western slope of the range. Where these faults are in basement rock, they can substantially inhibit the movement of ground water by disrupting the fracture and joint flow paths along the linear trend of the faults (e.g., due to the presence of fault gouge). Combined with the low permeability of the basement rock itself, this results in ground water of the upland areas being mounded and far above the elevation of the valley floor. Redlands Spring occurs where the piezometric surface of the fracture-flow ground water system intersects the ground surface at a north-south trending fault (Figure 3.2.2). The flow from Redlands Spring reinfiltrating back into the shallow alluvium in the bottom of Redlands Canyon is consistent with this conceptual hydrogeologic model as illustrated in Figure 3.3.5.

3. In contrast to the steep hydraulic gradient of the upland basement rock regime, the ground water surface in the basin alluvium is relatively flat, reflecting the much higher hydraulic conductivity of the porous sediments.

4. Wells MW-1, MW-2 and MW-3 (Figure 3.2.2) were drilled to provide hydrogeologic and water chemistry data for the proposed project. Well MW-2 was drilled at a location between the proposed mine pit and heap leach pad. The well was drilled through alluvium to its total depth of 345 feet. Unconfined ground water was encountered at a depth of about 293 feet (elevation 1,048). According to Briggs Project Chief Geologist, J.L. Christman, and based upon results of the exploration holes drilling in the vicinity of MW-2, bedrock is expected to be at an approximate depth of 600 to 700 feet. Therefore, the saturated alluvium may be as thick as 400 feet at MW-2 (Figure 3.3.5).



NOTE:
SEE FIGURE 3.2.2 FOR CROSS SECTION LOCATION.

FIGURE 3.3.5

CONCEPTUAL HYDROGEOLOGIC CROSS SECTION B-B' LOOKING NORTH

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5. Well MW-1 was drilled immediately downgradient of the proposed leach pad. The well penetrated alluvium to its total depth of 150 feet and unconfined ground water was encountered at a depth of about 110 feet (elevation 1,047).

6. Well MW-3 was also drilled immediately downgradient of the proposed leach pad. This well penetrated alluvium to its total depth of 165 feet. Unconfined ground water was encountered at a depth of about 70 feet (elevation 1,044).

7. Additional water level elevations were obtained from an open sump constructed near the western end of the site prior to Canyon exploration activities, and Well 23S/44E-3N1. Ground water contours based on these water level elevations are shown in Figure 3.2.2.

8. Canyon has drilled over 300 exploration borings in the proposed mine pit area. Based on subsurface conditions encountered in these borings, the mine pit is not expected to encounter the ground water table. The moisture content of the rock planned to be excavated is very low (i.e., about 3 percent). The bottom of the maximum mine pit would occur at an elevation of about 1,130 feet above MSL. Canyon has installed a piezometer near the location of the pit bottom to confirm that ground water will not be encountered. The piezometer location is shown in Figures 3.2.2 and 3.3.5. The ground water elevation at the piezometer location is about 1,120 feet above MSL.

3.3.2.4 Aquifer Analysis

1. A step-drawdown pumping test was conducted at Well MW-2 to assess the hydrogeologic characteristics of alluvium in the project vicinity. Pumping test rates varied between 10 gpm and 30 gpm and continuous pumping occurred for 8.5 hours. Drawdown results for each step of the test are summarized below.

PUMPING RATE (gpm)	DURATION OF PUMPING (minutes)	DRAWDOWN (feet)	CALCULATED HYDRAULIC CONDUCTIVITY (feet/day)	CALCULATED RADIUS OF INFLUENCE (feet)	SPECIFIC CAPACITY (gpm/foot)
10	269	2.3	15.0	108	4.3
20	350	4.6	15.3	218	4.3
26	24	9.2	10.1	353	2.8
30	118	11.5	9.4	429	2.6
		Average	**12.4**	**277**	**3.5**

2. The maximum drawdown of 11.5 feet represents about 2 percent of the saturated thickness of the alluvium estimated to occur at the well location. Recovery of the static water level occurred within one minute after pumping was stopped. The pump test data was analyzed using the Dupuit steady state equation for radial flow to a well partially penetrating an aquifer. Equilibrium levels for the various pumping rates were quickly established and did not show any influence of boundary conditions. Generally, the test showed that the alluvial sediments had an average hydraulic conductivity of approximately 12 feet per day (5×10^{-3} cm/sec) which is considered typical for medium to coarse grained alluvial sediments. The specific yield (yield volume per unit decline of piezometric surface per unit area) is estimated at about 0.1 indicating an unconfined aquifer. This result is generally consistent with pump test data available from Well 23S/44E-3N1 (Hydro-Geo Consultants, Inc., 1993b), which is located about 3/4-mile inside the playa margin.

3. The maximum pumping rate of 30 gpm used in the step-drawdown pumping test was limited by the design of the well (e.g., well diameter, pump depth and capacity, etc.) and is unrelated to potential yields that could be obtained from a well designed for water production (the tested well was designed for obtaining samples for water quality analysis, not water production). Based on the results of the pump test, Hydro-Geo Consultants, Inc. have estimated that yields on the order of 400 gpm should be attainable from two 200-foot deep wells with 50 feet of well screen, and higher yields could be obtained from deeper wells.

3.3.2.5 Local Water Use

1. There is currently no use of ground water in the project vicinity. The closest known ground water use occurs at Ballarat, over seven miles from the site, where well water is used for nonpotable purposes.

2. Water from Redlands Spring is used by Canyon for exploratory drilling. This water is piped via an aboveground small diameter plastic pipe and gravity flow to the exploration staging area at the mouth of Redlands Canyon. Canyon is entitled to utilize up to 500 gpd (about 0.35 gpm) under Water Use License No. 004054 issued by the SWRCB. Redlands Spring would not be used for the proposed project operations.

3. Designated beneficial uses of waters within the Panamint Valley are addressed in Section 3.3.1.3. Designated wildlife and recreational beneficial uses would apply to the ephemeral surface water flows from Redlands Canyon. The potential for aesthetic enjoyment

of Manly Fall is considered a component of noncontact water recreation. As discussed in Section 3.9, the historic Bennet-Arcan Party led by William Manly may have traversed the vicinity of Manly Fall. This potential historic interest is also considered by the RWQCB to be a component of noncontact water recreation. However, Manly Fall is only a geomorphic feature named after the adventurer William Manly, and not culturally or historically significant in itself.

3.3.2.6 Local Water Quality

1. Appendix D provides a summary of available water quality data for the site vicinity.

2. Water beneath the site is sodium chloride in character with TDS ranging from about 7,000 to 10,000 mg/L. The pH is near neutral (mean values range from 7.0 to 7.2). According to EPA standards, this water is not suitable for irrigation, wildlife consumption or domestic use. As discussed in Section 3.3.1.4, water quality deteriorates further toward the basin, as evidenced by the TDS concentration of 272,000 at Well 23S/44E-3N1.

3. Ground water quality would be suitable for ore processing. However, pretreatment may be required as discussed in Section 2.2.2.5.2. Also, wells may require special designs to mitigate the potential for the casings to corrode.

4. Water from Redlands Spring has also been monitored by Canyon. The spring water is calcium-sulfate in character with a TDS concentration of about 950. This water quality is substantially better than waters of the alluvial basin. Redlands Spring is considered to be an important resource for area wildlife.

3.4 VEGETATION

3.4.1 REGIONAL VEGETATION

3.4.1.1 Setting

1. Distribution of plant communities is largely affected by climate (moisture) and topography. The project site lies within the southwest corner of the Basin and Range physiographic province of eastern California (just north of the boundary of the Mojave Desert province). The region is characterized by hot summers, cool winters, and a very dry climate. Average annual precipitation is less than 4 inches on the valley floors and increases with elevation.

2. Geographically, the project area lies immediately west of Death Valley upon the west-facing toe slopes of the Panamint Range. Major topographic features found in the area which affect the distribution of plant species include mountainous areas with steep rocky slopes and canyons, bajadas (coalesced alluvial fan surfaces), dry washes, a playa (dry lake bed), and isolated springs and seeps. The mountain slopes rise steeply from alluvial fans and are cut by deep, narrow, canyons. Except for isolated springs, surface drainages are ephemeral, exhibiting flows only in response to severe precipitation events.

3.4.1.2 Vegetation Communities

1. The most common vegetation community in the project area is the Mojave creosote bush scrub. This community occurs on valley floors and lower slopes of alluvial fans, where sand and coarse soils predominate, generally below elevations of about 4,000 feet. This community is characterized by the presence of the creosote bush *(Larrea tridentata)* as one of the dominant species. It forms an open shrub community, about 2 to 8 feet tall, with considerable bare ground between shrubs. It is usually found on well-drained soils, often on bajadas and low hills, and is not found in highly salty or alkaline soils. ~~Other common species in this community include b~~Burro bush *(Ambrosia dumosa)*, ~~Mohave yucca (*Yucca schidigera*), Mormon tea (*Ephedra nevadensis*),~~ and ~~fiddleneck (*Amsinckia intermedia*)~~ *is also common in this community.*

2. In terms of regional distribution, the Mojave creosote bush scrub community is characteristic of the area and extends from the California desert region into southern Nevada and Utah, and northern Arizona. Mountains are surrounded by alluvial fans which descend to alluviated basin floors. Higher elevations of the mountain tops are inhabited by pinyon-juniper woodlands and western ponderosa forests. The alluvial fans/bajadas are typically occupied by creosote bush scrub associations. Desert riparian (affected by increased surface moisture)

plant communities dissect the fans in some areas along ephemeral washes that drain more substantial watershed areas. Toward the basin floors, saltbush communities predominate. Playas are typically barren of vegetation due to the high clay and salt content of the soils.

3. As further described in Section 3.7, the project site occurs within a "window" located within WSA 137, Manly Peak. Although there are no Unusual Plant Assemblages (UPAs) specifically designated in the CDCA Plan within WSA 137 (BLM, 1980), approximately 3 to 4 acres of riparian vegetation within the Redlands Canyon (see Section 3.4.2.2.3) are characteristic of wetland areas identified by the BLM as UPAs. UPAs were designated by the CDCA Plan as unusual based on one or more conditions, including restricted habitat, discontinuous distribution, age, size, or density. A stated goal of the CDCA Plan is to treat highly sensitive UPAs in a manner that will preserve their habitat and ensure continued existence.

3.4.2 LOCAL VEGETATION

3.4.2.1 Surveys Conducted

1. Extensive botanical ~~and wildlife~~ surveys have been conducted on the project site. Original surveys were conducted in 1989 (Bagley, 1989~~; Brown, 1989~~). However, since 1989 was a very dry year, the conditions resulted in limited plant growth. Subsequently, a follow-up baseline survey was conducted in the wet spring of 1991 (JBR, 1991). These surveys were conducted in April and again in late May and early June 1991, in order to assess both early and later blooming vegetation. A 1993 survey was conducted to: (1) quantitatively evaluate and describe previously designated vegetation communities; (2) verify previous findings; and (3) perform a sensitive species search (Cedar Creek Associates, Inc., 1993a). A subsequent, focused plant survey was also conducted in April 1993 to provide information on potential sensitive plant species during a year which produced normal or above normal precipitation spread through the winter and early spring rainy season (Bagley, 1993). Vegetation surveys were also conducted in 1993 at the offsite microwave relay station and at the margin of the playa west of the project site (EremiCo, 1993; JBR, 1993).

2. The following summarizes the methodology employed for each survey:
   - 1989 (Bagley): Vegetation community mapping, sensitive plant species surveys, and general vegetation inventory surveys were performed May 22 through 25. General walkover surveys were conducted within each vegetation community in conjunction with sensitive plant surveys. A list of all plant species encountered was compiled.

- 1991 (JBR): Walkover surveys were conducted April 23 through 27 and May 29 through June 2. Plant communities were investigated and species of plants found were identified. Major drainages and elevations within the project site were examined. Surveys were conducted over the lower elevations of the site to determine if jurisdictional wetlands occur.
- 1993 (Cedar Creek Associates, Inc.): Between February 19 and 21, the project site was intensively surveyed to determine a quantitative estimate of important vegetation variables. Vegetation classification was based on dominant floral species and habitat-related characteristics such as topographic position or surface soil texture.
- 1993 (Bagley): Walkover field surveys based on a search list of sensitive plant species were conducted April 19 through 23. Parallel transects were systematically walked over the alluvial fan and playa areas (transects spaced approximately 100 feet apart) and the mountain slopes and canyons were surveyed by walking up and down along ridgelines and drainages, and traversing some of the steep slopes.
- 1993 (EremiCo): A 100 percent coverage walkover field survey with transects spaced 10 feet apart was conducted at the offsite microwave relay station location in the Slate Range on August 11 (EremiCo, 1993b). The survey covered the proposed building site and an approximately 340-foot long access corridor from an existing road. Vegetation species observed were identified and specific attention was given to the possible presence of sensitive wildlife or vegetation species.
- 1993 (JBR): A survey was conducted to determine the Ordinary High Water Mark for the playa in the Panamint Valley and to determine Section 404 jurisdictional wetlands within and adjacent to the project site. Approximately 5.5 miles of playa edge near to the project site were surveyed November 8th and 9th.

Reports on these studies are hereby incorporated by reference.

3.4.2.2 Plant Communities

1. The Mojave creosote bush scrub plant community essentially covers the entire project site. Along the western boundary of the site, a very small portion of the property is vegetated by desert sink scrub, which generally covers the playa margin in this region. Beyond the margin, the playa surface is not vegetated. Also surveyed were small pockets of riparian habitat, arrowwood scrub and alkali seep, in the Redlands Spring area. These riparian areas are located to the east and outside of the project site boundary.

2. There is good correlation between vegetation mapping conducted by the various consultants (Bagley, 1989; 1993; JBR, 1991; Cedar Creek Associates, Inc., 1993a). The Cedar Creek analysis concurred with the previous analyses, but also included a more detailed categorization (six subtypes) of the Mojave creosote bush scrub community. Appendix E provides a

comprehensive listing of plant species observed onsite by community. Sections 3.4.2.2.1 through 3.4.2.2.4 provide a description of each community mapped on Figure 3.4.1.

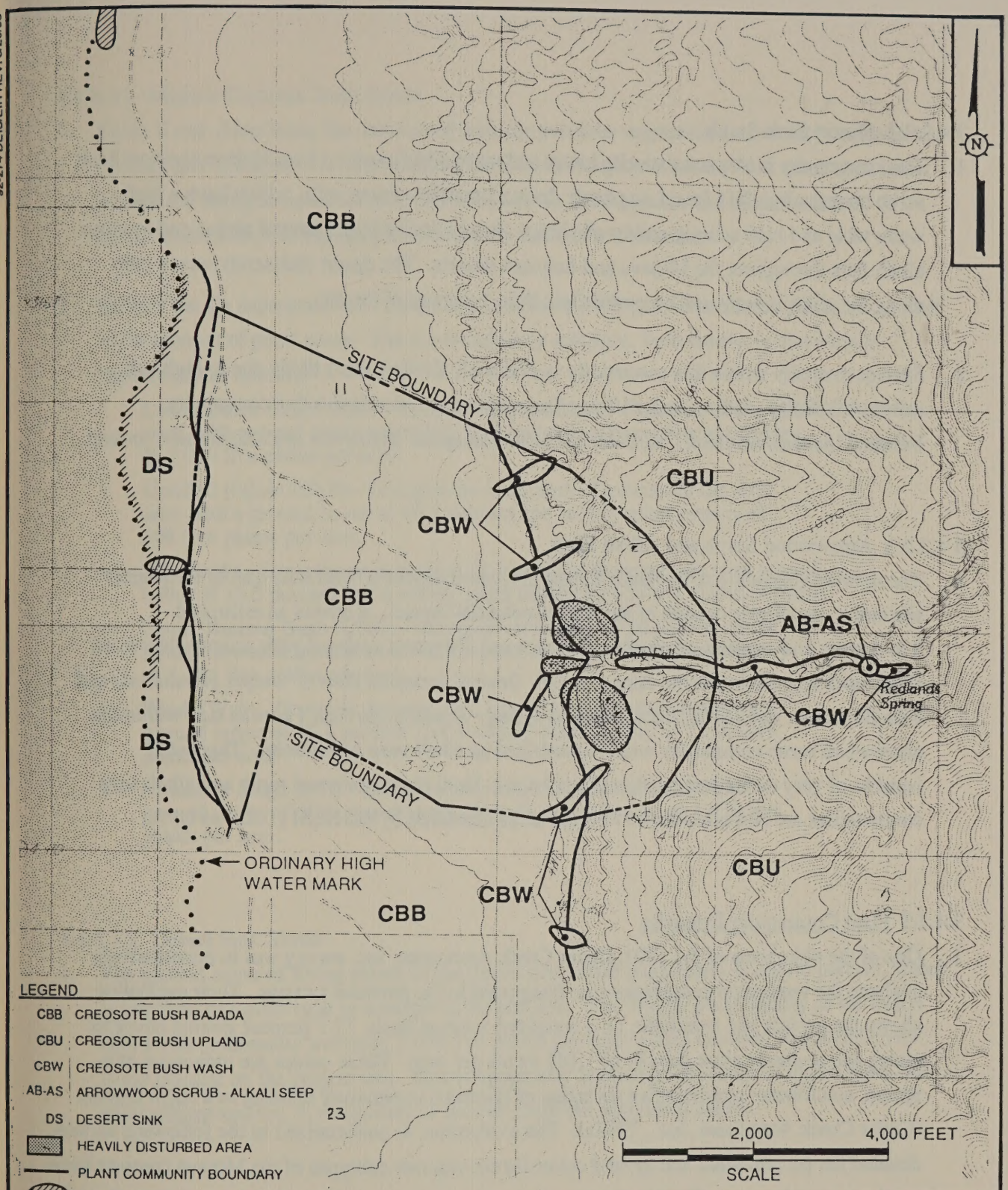
3. The offsite microwave relay station site at the top of the Slate Range also occurs in the Mojave creosote bush scrub plant community. Density of shrubs at the microwave relay station site was found to be sparse to moderate. A list of plant species observed is provided in Appendix E.

3.4.2.2.1 Mojave Creosote Bush Scrub

1. The Mojave creosote bush scrub plant community covers an estimated 99 percent of the project site. This community is dominated by creosote bush scrub and burro bush. Within the Mojave creosote bush scrub community there is a variability in composition due to differences in slope angle, soil texture, salinity and/or alkalinity, and surface water drainage patterns. Figure 3.4.1 depicts three types of this community: the upper slope (upland), bajada, and wash types.

2. The upper slope composition tends to have a higher concentration of burro bush and brittlebush *(Encelia farinosa)*, while the bajada composition has a higher concentration of allscale (*Atriplex polycarpa*) and desert holly (*Atriplex hymenelytra).* The desert washes at the site tend to have a somewhat different composition although still well within the parameters of the Mojave creosote bush scrub community. Other common species within the plant subcommunities are as follows (Bagley, 1989):

   - Bajada
     - Desert Indian wheat *(Plantago insularis)*
   - Canyons and Gullies (Washes)
     - Rush bebbia *(Bebbia juncea)*
     - Arrow leaf *(Pleurocoronis pluriseta)*
     - Goldeneye *(Viguiera reticulata)*
     - Threadleaf snakeweed *(Gutierrezia microcephala)*
     - Desert tobacco *(Nicotiana trigonophylla)*
     - Rock nettle *(Eucnide urens)*
     - Schott's spruce bush *(Peucephyllum schottii)*
   - Ridges and Mountain Slopes (Upland)
     - Woolly-headed barrel cactus *(Echinocactus polycephalus)*
     - Flattop wild buckwheat *(Eriogonum fasciculatum)*
     - Nevada mormon tea *(Ephedra nevadensis)*
     - Chaff-bush *(Amphipappus fremontii)*
     - Bedstraw *(Galium)*
     - Threadleaf snakeweed *(Gutierrzia microcephala)*
     - California barrel cactus *(Ferocactus cylindraceus)*



LEGEND

CBB	CREOSOTE BUSH BAJADA
CBU	CREOSOTE BUSH UPLAND
CBW	CREOSOTE BUSH WASH
AB-AS	ARROWWOOD SCRUB - ALKALI SEEP
DS	DESERT SINK
	HEAVILY DISTURBED AREA
	PLANT COMMUNITY BOUNDARY
	JURISDICTIONAL WETLANDS (SEE NOTE)

NOTE:
THE COE HAS DETERMINED THAT A NARROW ZONE (ABOUT 50 FEET WIDE) OF JURISDICTIONAL WETLANDS OCCURS WITHIN THE VEGETATED MARGIN OF THE PLAYA WEST OF THE SITE, ADJACENT TO THE ORDINARY HIGH WATER MARK. THIS FIGURE EXAGGERATES THE WIDTH OF THIS ZONE FOR CLARITY.

REFERENCES:
1. 7.5 MINUTE TOPOGRAPHIC MAP OF MANLY FALL, CALIFORNIA; DATED 1984.
2. VEGETATION COMMUNITIES FROM JBR, 1991.
3. DISTURBED AREAS FROM BAGLEY, 1989.
4. JURISDICTIONAL WETLANDS FROM JBR, 1993, AND COE, 1994.

FIGURE 3.4.1

PLANT COMMUNITIES

BRIGGS PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

3.4.2.2.2 Desert Sink Scrub

1. This community is characteristically lower and more widely spaced than Mojave creosote bush scrub community. It is found on poorly drained, usually clayey soils, which have a high water table and high salinity and/or alkalinity. It is typically found around playas and in moist alkali flats throughout the Mojave and Sonoran deserts. The desert sink scrub occurs only along the playa margin and comprises less than 1 percent of the site.

2. Species diversity within this community is extremely limited, most likely due to high soil salinity/alkalinity. Iodine bush *(Allenrolfea occidentalis)* dominates this community. Inkweed (*Suaeda moquinii),* allscale, and inland saltgrass (*Distichlis spicata*) are also present.

3.4.2.2.3 Arrowwood Scrub and Alkali Seep

1. The riparian vegetation at Redlands Spring is located about one-half mile east of the project site and is completely outside of the area of potential impact. It covers an estimated 3 to 4 acres and consists primarily of arrowweed *(Tessaria sericea)* with squaw waterweed *(Baccharis sergiloides)* at the drier margins. Several mesquite trees (*Prosopis glandulosa*) and a single willow tree (*Salix*) occur near the spring. A patch less than 1 acre in size within the arrowwood scrub community was characterized as alkali seep community. This patch consists of very dense small sedge *(Eleocharis).* Both the arrowwood scrub and alkali seep communities are characteristic of wetland areas identified by the BLM (1980) as UPAs.

3.4.2.3 Plant Community Densities

1. One of the objectives of the 1993, Cedar Creek Associates, Inc. survey was to quantitatively evaluate the vegetation communities as designated in the previous surveys. Their evaluation shows the project site to exhibit, on a weighted average basis, 12.1 percent ground cover by plants and a woody plant density of 1,195 stems per acre. These values are indicative of a sparse, nondiverse, unproductive (in terms of biomass) community existing in a harsh climate (Cedar Creek Associates, Inc., 1993a). The evaluation, as summarized in the following section, detailed the percent plant and ground cover for six separate subtypes of the Mojave creosote bush scrub community, as well as the desert sink scrub community. Cedar Creek Associates, Inc. did not quantify the offsite arrowwood scrub and alkali seep communities located at Redlands Spring, because these communities would not be impacted by the Briggs Project.

3.4.2.3.1 Mojave Creosote Bush Scrub

1. Cedar Creek Associates, Inc. concurred with the previous vegetation community designations (as depicted in Figure 3.4.1), but further divided the Mojave creosote bush scrub type into a total of six subtypes based on identifiable dominant floral species and habitat-related characteristics such as topographic position or surface soil textures.

2. Each of the six subtypes of this community exhibit a difference in dominant plants, and a shift in the amount of plant cover. The six community subtypes, from lowest in elevation to highest, are as follows:
   - Lower Burro Bush (LBB) - Occupies approximately 7 percent of the total area, with ground cover averaging 12.9 percent and woody plant density of 1,010 live plants per acre.
   - Uplifted Bajada (UpB) - Occupies an estimated 12 percent of the total area with a ground cover of 10.1 percent and woody plant density of 508 live plants per acre.
   - Bajada (B) - Occupies an estimated 31 percent of the total area with ground cover of 16.5 percent and a woody plant density of 654 live plants per acre.
   - Upper Burrow Bush (UBB) - Occupies an estimated 20 percent of the total area with a ground cover of 8.8 percent and a woody plant density of 1,185 live plants per acre.
   - Wash (Wsh) - Occupies an estimated 3 percent of the total area with a ground cover of 16.4 percent and a woody plant density of 1,500 live plants per acre.
   - Mountain Slope (MS) - Occupies 26 percent of the total area with a ground cover of 10.6 percent and a woody plant density of 1,930 live plants per acre.

3.4.2.3.2 Desert Sink Scrub

1. The ground cover of living plants in the desert sink scrub community is only 6 percent, which is less than any other type or subtype in the site area. The woody plant density of the desert sink scrub community averages 3,450 live plants per acre, which contrary to ground cover, is the greatest on the project site. This is apparently because each clump of iodine bush, the predominant species, is comprised of several small but individual plants.

3.4.2.4 Jurisdictional Wetlands

3.4.2.4.1 Playa Wetlands

1. Investigations to determine if jurisdictional wetlands occur on or near the project site were conducted in April 1991 and November 1993 (JBR, 1991; 1993), and revealed that there are

no jurisdictional wetlands on the site. Two small locales (i.e., less than 2 acres each) of jurisdictional wetlands were documented nearby, however, along the eastern edge of the playa (Figure 3.4.1). One of these is located adjacent to the site and the second is located about one mile north of the site.

2. The dominant plant species at these locales is iodine bush. Saltgrass ~~*(Distichlis spicata)*~~, pickleweed *(Salicornia utahensis)*, wiregrass (*Juncus cooperi*), and molly (*Kochia americana*) also occur. Soils are typically saturated near the surface, but there is normally no surface water. While these locales do fit the hydrologic, vegetative and soil characteristics of jurisdictional wetlands, the investigator concluded that their vegetation, wildlife and water value is low because of the following (Jarvis, 1994):
   - There is only a subtle change between the small wetland locales and the surrounding area.
   - Vegetation density and variability ~~is~~ are low.
   - Water quality is poor, and there is normally no surface water present.
   - Soils are highly alkaline.

3. The COE confirmed the delineation of these small wetland locales based on review of the JBR reports and field confirmation. In addition, the COE classified a narrow band (less than 50 feet wide) of the playa margin in the site vicinity as jurisdictional wetlands. This narrow band occurs just above the ordinary high water mark. Vegetation within the band is not identifiably different from the surrounding desert sink plant community.

3.4.2.4.2 Canyon Wetlands

1. The small areas of arrowwood scrub and alkali seep found outside of the project site boundary in association with Redlands Spring (as previously described) would also qualify as jurisdictional wetlands. Vegetation in these areas is discussed in Section 3.4.2.2.3.

3.4.2.5 Protected or Special Interest Plant Species

1. The sensitive species analysis for the project site was initiated by evaluating plants which could be anticipated to occur within a 60-mile radius of the site (Bagley, 1989). The initial search list was updated and supplemented by information from a number of resources including the CNDDB, NPS, and BLM information sources. Species were considered sensitive if they were: federally or state listed as rare, threatened, or endangered species; federal candidates for listing (Category 1 or 2); CNDDB special plants, or; listed by the CNPS in their inventory of rare and endangered plants of California.

2. Eighteen sensitive plant taxa were determined to have some potential to occur in the area (see Appendix E). None of these species are federally or state listed or proposed rare, threatened or endangered. Three of the 18 species are federal candidate species (Category 2), seven are listed as rare or endangered in California by CNPS (List 1B or 2), two are on the CNPS review list (List 3), and the remaining nine are on the CNPS watch list (List 4).

3. No federal or state listed, proposed or candidate rare, threatened or endangered plant species were observed during any of the surveys on the project site, or at the proposed microwave repeater station location. Nor were any species observed which are listed as rare, threatened or endangered by CNPS. One, and possibly a second, sensitive plant species listed on the CNPS watch list was found to occur on the project site. These species are Knapp's brickellia *(Brickellia knappiana)* and barrel cactus (Cedar Creek Associates, Inc., 1993a). The CNPS watch list designates plants which are of limited distribution and should be monitored regularly. Species on this list are not classified as "rare" from a statewide perspective ~~and are not granted any regulatory protection~~.

3.5 WILDLIFE

3.5.1 REGIONAL WILDLIFE

3.5.1.1 ~~Overview~~ Setting

1. The project site is located on the western slopes and alluvial fans of the Panamint Range (within the USGS Manly Fall 7.5 minute quadrangle). This mountain range supports diverse wildlife due to the variety in elevation and available habitats (see Appendix E).

2. The proposed project site is located within a BLM Wildlife Habitat Management Area (WHMA) as identified in the CDCA. This area, known as the West Panamint Mountains Canyon, has a "Special Area" designation which highlights habitats and species known to be important for special consideration in the environmental assessment process for any kind of project. A habitat management plan (a detailed plan developed specifically for wildlife habitats or species which require intensive, active management) has been proposed within the CDCA for this area but, at this time, has not been prepared. Although, A Sikes Act Management Plan for the Surprise Canyon Area of Critical Environmental Concern within the larger Western Panamint Mountains Canyons WHMA was approved in 1982. ~~The site is located within an area called the West Panamint Mountain Canyons Wildlife Management Area (WMA) as designated by the BLM. The WMA includes 121,000 acres along the west side of the Panamint Range. This WMA area is actively managed for wildlife by means of identifying special habitats, formulating a management plan, designating special areas, and entering into agreements with the DFG and private landowners.~~

3. ~~The western portion of the Panamint Range provides habitat for desert bighorn sheep. Prairie falcons also utilize the western Panamint Range slopes and valley floor for foraging.~~

4. ~~The Panamint kangaroo rat (*Dipodomys panamintinus*), a BLM proposed sensitive species of very limited distribution, also occurs in the region. The Panamint alligator lizard (*Gerrhonotus panamintinus*), a DFG Species of Special Concern and a Category 2 federal candidate species, is known to occur in the Surprise Canyon area northwest of Ballarat. The chuckwalla (*Sauromalus obesus*), a Category 2 federal candidate species, is also known to occur in the area. The Mohave ground squirrel (*Spermophilus mohavensis*) has been reported to exist in the Trona area, approximately 16 to 20 miles southwest of the project site (JBR, 1991). The Trona area is at a higher elevation and receives more precipitation than the project site. The desert tortoise (*Gopherus agassizii*), a federally and state-listed threatened species, has been sighted approximately eight miles southwest of the site, on the south side of the Slate Range (NECI, 1992).~~

3.5.1.2 ~~Sensitive~~ Regional Protected or Special Interest Wildlife Species

1. ~~Based on the records of the DFG-NDDB, several sensitive species are known to occur within the region.~~ The following sections discuss protected or special interest wildlife species ~~are~~ listed ~~to occur (observed) within~~ in the DFG - NDDB for the area covered by the USGS quadrangles: Manly Fall, ~~quadrangle (on which the project site is located) and the adjacent~~ Ballarat, ~~quadrangle:~~ and Slate Range. Also reviewed are other special interest species (not listed in the NDDB for the vicinity) which were observed during one or more of the biological surveys conducted for the Proposed Action. Local and site-specific information regarding protected or special interest wildlife species is included in Section 3.5.2.6.

   - ~~Nelson's bighorn sheep (*Ovis canadensis nelsoni*) - a BLM designated sensitive species and a state fully protected species.~~
   - ~~Mohave ground squirrel - a state threatened species.~~
   - ~~Prairie falcon (*Falco mexicanus*) - a state Species of Special Concern.~~
   - ~~Townsend's big-eared bat (*Plecotus townsendii*) - a state Species of Special Concern.~~
   - ~~Panamint alligator lizard - a state Species of Special Concern.~~

2. ~~Panamint Valley is also within the range of the desert tortoise. The desert tortoise is listed as a threatened species on both the state and federal endangered species list. A "threatened species" is defined as "a species likely to become endangered in the foreseeable future through all or a significant portion of its range." Threatened species are fully protected under the ESA.~~

3.5.1.2.1 Desert Tortoise

1. A federally listed threatened species and a state-listed threatened species, desert tortoise (*Gopherus agassizii)* populations have declined over the last 50 years due to taking of animals as pets, shooting, road kills, raven predations, destruction of burrows by off-road vehicles and cattle, reduction in habitat, destruction of habitat quality, and diseases. Threatened populations include those north and west of the Colorado River in California, southern Nevada, Arizona, and southwestern Utah. In efforts to protect the desert tortoise, BLM adopted the *Desert Tortoise Habitat Management on the Public Lands: a Range Wide Plan* (BLM, 1988c) and also prepared *Recommendations for Management of the Desert Tortoise* (BLM, 1988d). Critical habitat area for the desert tortoise has been designated by USFWS (Federal Register, Vol. 59, No. 26, pg. 5820, February 1994) to provide additional protection under Section 7 of the Endangered Species Act with regard to activities that require Federal agency action.

2. The Briggs project site lies northeast of the closest BLM designated desert tortoise habitat. The designated habitat extends north and east of Searles Dry Lake playa along the western

base of the Slate Range (Rado, 1994). Tortoises have been recorded near Trona and have been sited in Panamint Valley about five miles south of Redlands Canyon (Brown, 1989). Fresh tortoise scat and a tortoise burrow were discovered two miles east of the mouth of Coyote Canyon, approximately five miles south of Redlands Canyon (Brown, 1993).

3.5.1.2.2 Mohave Ground Squirrel

1. A state-listed threatened species and a federal Category 2 candidate for listing, the Mohave ground squirrel (*Spermophilus mohavensis*) occurs only in the western Mojave Desert, from Olancha in Inyo County south to Victorville in San Bernardino County, and from the Tehachapi Mountains in Kern County east to the Granite Mountains in San Bernardino County. Its habitat includes alkali sink and saltbush, creosote bush scrub, and Joshua Tree woodland. The species is threatened due to its limited range and rapid rate at which the habitat is being destroyed by urbanization, agricultural and recreational use, and development (California Fish and Game Commission and DFG, 1980).

2. The Mohave ground squirrel is known to occur north, west and south of the project site in similar habitat (Mojave Creosote Bush Scrub). A capture has been documented approximately 10 miles southwest of the project site in Searles Valley, and a sighting was noted near China Gardens Spring, approximately 35 miles northwest of the site (Brown, 1989). Based on results of trapping efforts discussed in Section 3.5.2.6.2, this species does not occur in the site vicinity. The Mohave ground squirrel has been reported to exist in the Trona area, approximately 16 to 20 miles southwest of the project site (JBR, 1991). The Trona area is at a higher elevation and receives more precipitation than the project site.

3.5.1.2.3 Nelson's Bighorn Sheep

1. Based on information collected by DFG and other federal, state and local agencies, the 1993 statewide bighorn sheep population is estimated to be 4,800 animals, distributed in approximately 59 separate herds (DFG, 1994). There are three races, or subspecies, of bighorn sheep in California: the Peninsular, California and Nelson bighorn. The Nelson bighorn sheep *(Ovis canadensis nelsoni),* which is widely distributed and abundant relative to the other two subspecies, occurs within the western Panamint Range. The Nelson subspecies numbers about 3,900 and is found in the Transverse Ranges, throughout the Mojave Desert, and in the eastern portion of the Sonoran Desert. According to DFG, the Panamint Range sustains a resident population of approximately 144 bighorn sheep (DFG, 1995).

2. The current estimate of bighorn sheep in California is less than one-half of the estimated 10,000 sheep population in 1800. Reasons for the population decline include the influx of miners, unregulated hunting, grazing of domestic livestock, and introduced disease.

3. In 1986, state legislation was enacted, declaring that bighorn sheep were an important wildlife resource. Policies were set forth for the preservation, restoration, utilization and management of the state's bighorn sheep population (Amendments to Section 3950 and 4700; addition of Sections 4900-4905 and 12008.5 to the Fish and Game Code). The legislation directed DFG to prepare management plans for each population of bighorn sheep in California.

4. The state's wildlife conservation policy contains an objective to provide sport hunting, where such use is consistent with maintaining healthy wildlife populations. The 1986 bighorn sheep legislation includes provisions to authorize sport hunting of bighorn rams in management units for which plans have been developed. In accordance with the law, the Fish and Game Commission (Commission) may authorize the take of no more than 15 percent of the mature bighorn rams from each management unit, as determined by DFG's annual population estimate.

3.5.1.2.4 Bats

Townsend's Big-Eared Bat

1. A federal candidate (Category 2) species for threatened or endangered status and a state Species of Special Concern, the Townsend's big-eared bat (*Plecotus townsendii*) occurs throughout California. Known roosting sites include limestone caves, lava tubes, mine tunnels, buildings, and other human-made structures (DFG, 1986).

2. Bat colonies represent a clumped resource. Because favorable roost sites concentrate bat populations, disturbances to colonies can have regional consequences. Habitat for the Townsend's big-eared bat must include appropriate roosting, maternity, and hibernation sites. In most areas of California, the decline in the Townsend's bat populations has been quite dramatic, in part due to its high sensitivity to roost disturbance. In the desert areas, this species is now found almost entirely in mine adits which exhibit a specific temperature and humidity range (Brown, 1989).

3. In a regional context, there are three known Townsend's big-eared bat maternity colonies on China Lake Naval Weapons Station to the west (totaling approximately 300 bats), a maternity colony near Haiwee Reservoir that contained about 100 bats several years ago, a maternity

roost in a mine in the eastern Inyo Mountains (100 bats), and a maternity colony in Death Valley in Titus Canyon that once had over 100 bats, but now contains less than 20 after recent vandalism (Brown, 1995).

4. Within the Panamint Range, there are four known Townsend's bat maternity roosts: a single population inhabits the Briggs and "north" Briggs adits (totaled 250, mothers and juveniles, at the end of the 1993 maternity season), an unknown population in a mine in Tuber Canyon, and a large colony at the Jackpot Canyon Mine (230 bats, as of August 1993). Bats or bat guano has also been observed in the Cecil R Claimblock and Goldtooth mine. Other unknown roosts may occur elsewhere in the Panamint Range.

Pallid Bat

1. The pallid bat *(Antozous pallidus)*, a California Species of Special Concern, is uncommon, but widespread throughout the state in a variety of habitats below 6,000 feet (Brown, 1995). Many of the roosts and foraging habitat of the coastal subspecies *(A.p. pacificus)* have been destroyed in the past 25 years. The desert subspecies *(A.p. gallidus)* is less-studied. It roosts in crevices in rocks, mines and buildings, and forages on large moths and beetles and ground dwelling arthropods. Pallid bats form large maternity colonies and also congregate in night roosts after foraging. They are hard to find during the day, since they roost in crevices.

Mastiff Bat

1. The western mastiff bat *(Eumops perotis)*, a Category 2 federal candidate species, occurs from central California southward to central Mexico. In California, the bats were once widespread in the San Joaquin Valley, Salinas Valley, and coastal lowlands from the San Francisco Bay area southward to San Diego (DFG, 1986). Factors potentially contributing to declining populations include loss of habitat due to urbanization, cultivation of major foraging areas, and widespread use of insecticides. This bat roosts in crevices in large rocks and cliff faces (Brown, 1989).

3.5.1.2.5 Panamint Alligator Lizard

1. A DFG Species of Special Concern and a federal candidate (Category 2) species, the Panamint alligator lizard (*Gerrhonotus panamintinus*) has been found near isolated springs and water sources in the desert mountain ranges of Inyo County and southeast Mono County,

California, including the Panamint, Nelson, Inyo, White and Argus mountains. The closest known occurrence of the species to the project area is Surprise Canyon, approximately 12.5 miles to the north. This species ranges from scrub desert and Joshua tree habitat up into the lower edge of the piñon-juniper belt and seems to prefer areas of rockslides and dense plant growth near water.

3.5.1.2.6 Chuckwalla

1. The chuckwalla *(Sauromalus obesus)* is listed as a Category 2, federal candidate species. It is a widespread reptilian species, but is collected heavily for the pet trade.

3.5.1.2.7 Burrowing Owl

1. The burrowing owl is a California bird Species of Special Concern, second priority. Conversion of natural habitat to agriculture and the destruction of ground squirrel colonies have been the main factors causing the decline of burrowing owl populations (LaBerteaux, October 1993). Additionally, nests along roadsides are likely to be destroyed by road maintenance activities or off-highway vehicles. Individuals are also hit by passing cars and sometimes are shot.

3.5.1.2.8 Prairie Falcon

1. A state Species of Special Concern, the prairie falcon *(Falco mexicanus)* was once a common permanent resident throughout most of California. Pesticide contamination is believed to have resulted in a decline in population in the Central Valley. Although desert populations are high, human activity near nest sites has negatively impacted fledging success (DFG, 1978).

3.5.1.2.9 Le Conte's Thrasher

1. The Le Conte's thrasher is a DFG Species of Special Concern. Its primary habitat is open desert wash, desert scrub, alkali desert scrub, and desert succulent scrub (DFG-NDDB, 1995). This species is not in any present danger of extirpation, but because of its small populations in California, would be vulnerable if a threat materialized (LaBerteaux, 1993).

3.5.1.2.10 Ferruginous Hawk

1. The ferruginous hawk (*Buteo regalis*) is a Category 2 Federal Candidate species. This species is not known to breed anywhere in California (Bloom, 1995). The closest known breeding area to the project area is northern Nevada. This hawk does migrate south through California, and forages primarily on small rodents.

3.5.1.2.11 Short-Eared Owl

1. The short-eared owl (*Asio flammeus*), a California Species of Special Concern, once bred locally throughout California where suitable habitat was available, but can no longer be considered common. Destruction of marsh and tall grassland habitat in lowlands is considered the main cause for the decline (DFG, 1978).

3.5.1.2.12 Yellow Warbler

1. A DFG Species of Special Concern, the yellow warbler (*Dendroica petechia*) requires riparian situations to breed. Destruction of riparian habitat and its susceptibility to cowbird parasitism are cited as contributing to the state's decline in Yellow warbler populations (DFG, 1978).

3.5.2 LOCAL WILDLIFE SPECIES

3.5.2.1 Surveys Conducted

1. The description of local wildlife was developed from numerous wildlife surveys, including several focused studies for special interest wildlife ~~sensitive~~ species. The description in this section was compiled from the results of the following surveys which were conducted to ~~determine~~ compile baseline data for the project site, as well as to assess the potential occurrence of rare, threatened, or endangered species:

   - 1989 (Brown): Field survey was conducted between April 30 and August 20 to document wildlife resources with special attention focused on species which are fully protected or candidates for protection by governmental agencies. This study included a total of 48,000 live trap hours for the Mohave ground squirrel. Traps were opened at least eight hours a day (in addition to five days when the traps were left open overnight to sample for nocturnal rodents).
   - 1989 (LaBerteaux): Birds were recorded as they were observed during the wildlife survey of the project area between May 22 and June 12.
   - 1991 (JBR): Follow-up surveys to the 1989 investigations were conducted in late April 1991, since the dry 1989 year may have resulted in reduced wildlife activity. In addition to general wildlife surveys, the surveys included a search for ~~sensitive~~ protected or special interest species, raptor

nest searches, and composition and density species analysis. The surveys included small mammal trapping, conducted on three consecutive nights, and emlen transects which began within one-half hour of sunrise. Only diurnal sight surveys were conducted for the Mohave ground squirrel.

- 1992 (NECI): Focused surveys for the Mohave desert tortoise were conducted May 27 through May 31 and June 13 through June 15 in accordance with the FWS *Field Survey Protocol for Federal Actions Within Desert Tortoise Habitat.* This work included:
  - One hundred percent coverage survey of the project site with biologists walking transects separated by no more than 30 feet.
  - Zone of influence survey with transects from 100 to 4,600 feet outside the 100 percent survey area.
  - Twenty-six triangular transects of areas within three miles of the project site.
- 1992 (Weaver): Survey of ~~Focused survey for the~~ bighorn sheep and bighorn sheep habitat. The survey included a field ~~site~~ visit to the project site vicinity (May 21) and helicopter flight (May 22) to examine a six to seven mile radius around the mouth of Redlands Canyon.
- 1993 (EremiCo): Focused Mohave ground squirrel study (EremiCo, 1993a), including: (1) a trapping study conducted between April 19 and 23; and (2) a May 4 and 11 trapping study, in areas determined in consultation with the DFG as having the best potential habitat for the Mohave ground squirrel. During the May survey, traps were open ~~operated~~ continuously between 0700 and 1800 hours on five days, but were closed due to high temperatures on two days between 1400 and 1800 hours.
- 1993a,b (Brown): Winter (January 31) and spring (April 22 through 26) bat surveys were conducted ~~(Brown 1993a; 1993b). The main focus of these studies was~~ to census bats at the project site and determine if adits in the surrounding areas sheltered Townsend's big-eared bats. ~~an FWS Category 2 federal candidate for threatened or endangered status and a DFG Species of Special Concern.~~ Mines were searched for bats and fresh guano during the day.
- 1993c (Brown): Summer (August 13 through 16, and August 26) and late summer (September 15 and 22) bat surveys were conducted ~~(Brown, 1993c)~~. The main focus of this study was to recensus the bats in the project area and determine potential alternate roosts for the maternity colonies of Townsend's big-eared bats found during previous work. On August 13, 1993, bats were captured and banded, and on the 14th, night vision equipment was used to census bats exiting the mine. Other mines were entered during the day to search for banded bats and fresh guano to determine the location of the bats.
- 1993 (EremiCo): Summer (August 11) survey of the proposed microwave station site at the top of the Slate Range was conducted (EremiCo, 1993b). This survey focused on determining whether there is evidence of use of the microwave station site by ~~sensitive~~ protected or special interest species, and identification of wildlife observed. A Cumulative Human Impact Evaluation following DFG protocol was also conducted.
- 1993 (EremiCo): Focused native vegetation and wildlife surveys were conducted at the two potential offsite borrow areas located on the playa in the Panamint Valley (September 9, 1993). Special attention was given

to observation for California state- and federal-listed threatened and endangered plants and animals as well as other ~~sensitive~~ protected or special interest species (EremiCo, 1993c).

- 1993 (Rado): Literature search and site survey (December 16, 1993) of the playa to determine potential presence of native fishes and fairy shrimp. During this survey, particular attention was paid at locations of standing water along four separate portions of the eastern playa edge between the proposed project site and Post Office Spring near Ballarat.
- 1994 (EremiCo): A survey of birds utilizing the playa area was conducted on May 19 (between 1730 to 2015 hours) and May 20, 1994 (between 0530 and 0845 hours). All birds seen were recorded, but the focus of this survey was to observe for the possible presence of the snowy plover, a DFG Species of Special Concern.
- 1994 (Rado): A focused survey for the Mohave desert tortoise was conducted on March 12 and 13 to confirm that this species does not utilize the site. Portions of the site with the greatest potential for the occurrence of tortoise were surveyed with 100 percent coverage.

Reports on these studies are hereby incorporated by reference.

2. Comprehensive wildlife species lists for reptiles, mammals, and birds compiled from the project site surveys are included in Appendix E.

3.5.2.2 Reptiles

1. Seven species of reptiles were observed in the site area (JBR, 1991). The side-blotched lizard (*Uta stansburiana*) was most commonly encountered. Great basin whiptails (*Cnemidophorus tigris*) were seen on several occasions, as were zebra-tailed lizards (*Callisaurus draconides).* Individual sittings included: a chuckwalla, a Category 2 federal candidate species, a desert banded gecko (*Coleonyx varieratus*), a desert patch-nosed snake (*Salvadora hexalepis)*, and a Panamint speckled rattlesnake (*Crotalus mitchelli).* A comprehensive list of all reptiles observed on the site during various surveys is included in Appendix E.

2. In addition, the ~~Mohave~~ desert tortoise, a state and federal listed threatened species, is known to exist in the general vicinity of the project site. ~~Tortoises~~ As noted in Section 3.5.1.1, tortoises have been recorded near Trona and also have been sighted ~~sited~~ about five miles south (Brown, 1989) ~~and about eight mile southwest of the site.~~ These areas are characterized by sandier soils and higher precipitation than the project site. Tortoise scat has been observed in Coyote Canyon, located about 5 miles south of the site, in terrain more similar to the project site. Extensive field surveys indicate that ~~the~~ desert tortoise are not in residence at the project site (NECI, 1992; Rado, 1994).

3.5.2.3 Aquatic Invertebrates

1. The playa was inventoried for aquatic species which potentially could be indirectly impacted by the mining operation, or directly impacted by offsite excavation at the potential clay borrow sites. A literature search revealed only one previous aquatic invertebrate survey. The survey included several trips in 1978 and did not identify any native or nonnative fish species, or any aquatic invertebrates of limited distribution in the south portion of the Panamint Valley playa (Rado, 1993). Fairy shrimp *(Branchinecta anostraca)*, a unique species of invertebrates, were not recorded during this inventory. Five species of the fairy shrimp, however, are known to occur in the northwestern portion of the Mojave Desert. One species, the giant fairy shrimp (*Branchinecta gigas*), is on the DFG Special Animal List (see Section 3.5.2.6.6).

2. No fish or fairy shrimp were present at any of the four areas of standing water surveyed along the eastern playa edge (Rado, 1993). Approximately six miles north of the project site, an abundant population of brine shrimp was found. Another small population was found in a shallow pool west of the site. Aquatic vegetation was only observed at one site, Post Office Spring, indicating a lower salinity than the other sites examined. However, no aquatic fauna species were observed in the spring.

3. Based on the field survey and examination of available literature, the December 1993 survey concluded that there are no species of fish at the Panamint Valley playa (Rado, 1993). Various species of fairy shrimp, however, have been collected in Panamint Valley (EremiCo, 1993c). None of these species is of limited distribution or special management status.

3.5.2.4 Birds

1. The bird species most often observed in the 1991 survey by JBR was the black-throated sparrow *(Amphispiza bilineata)*. Singing rock wrens (*Salpinctes obsoletus)*, and chipping sparrows (*Spizella passerina)* were also regularly encountered. However, the 1991 surveys were conducted during migration (April), and several of the species observed would not be expected to nest in the area. Raptor sightings included a red-tailed hawk *(Buteo jamaicensis)* and a kestrel *(Falco sparverius)*. An active red-tailed hawk nest was located in the mountainous area and an active raven nest was observed at Manly Fall. Rock ridges surrounding canyons in the upland habitat provide perching and nesting sites for raptor species.

2. Of the 33 species of birds observed in the site area in the 1989 survey by LaBerteaux, the ferruginous hawk *(Buteo regalis)* is a Category 2 federal candidate species, and the yellow warbler *(Dendroica petechia)* is a DFG Species of Special Concern which requires riparian situations to breed. Other DFG Species of Special Concern which are expected to occur in the site vicinity include the golden eagle *(Aquila chrysaetos)*, northern harrier *(Circus cyaneus)*, sharp-shinned hawk *(Accipiter striatus)*, Cooper's hawk *(Accipiter cooperii)*, prairie falcon, burrowing owl *(Athene cunicularia)*, black-tailed gnatcatcher *(Polioptila melanura)*, Le Conte's thrasher *(Toxostoma lecontei)*, willow flycatcher *(Empidonax traillii)*, and yellow-breasted chat *(Icteria virens)* (Brown, 1989).

3. Panamint Valley is part of a closed drainage system and water accumulates in the playa from adjacent areas after rainstorms. It is probable that the Panamint Valley is also an important rest stop for several species of waterfowl during migration. However, since the playa wildlife survey was conducted ~~in September,~~ when the playa ~~lakebed~~ was dry, information regarding waterfowl was obtained from a literature review and interviews (EremiCo, 1993c). The following waterfowl have previously been observed on the lake: cinnamon teal (*Anas cyanoptera*), redheads (*Anas americana*), and buffleheads (*Bucephala albeola*). It is possible that a small population of the snowy plovers (*Charadrius alexandrinus*), a DFG Species of Special Concern, breeds on the playa in the Panamint Valley. Plovers feed within a few meters of water; hence, access to water is a breeding requirement. Known breeding populations of snowy plovers in ~~close~~ proximity to Panamint Valley occur at Owens Lake in Inyo County, and China Lake in San Bernardino and Kern Counties. A survey for the snowy plover occurred in spring of 1994, and none were observed (EremiCo, 1994). Other shorebirds observed in Panamint Valley include least sandpipers (*Calidris minutilla*), black-necked stilts (*Himantopus mexicanus*) and American avocets (*Recurvirostris americana*). A list of all birds observed or expected in the site area is included in Appendix E.

3.5.2.5 Mammals

1. Small nocturnal mammal signs (such as burrows) were observed at numerous locations within the project site. Live trapping studies yielded small species including the deer mouse *(Peromyscus maniculatus)*, canyon mouse, *(Peromyscus crinitus)* and long-tailed pocket mouse *(Chaetodipus formosus)*. Kit fox *(Vulpes macrotis)* and coyote *(Canis latrans)* tracks, digging and scat and badger (*Taxidea taxus*) digging were also observed in several areas. Two active kit fox dens and a jack rabbit *(Lepus californicus)* femur were also found on the project site (JBR, 1991). A listing of all mammals either observed or expected to occur on the site is included in Appendix E.

2. Bats were observed in both the 1989 survey by Brown and the 1991 survey by JBR, ~~wildlife surveys~~ as well as subsequent bat surveys. Four species of bats were observed in the 1989 survey, including the Townsend's big-eared bat. ~~which is designated as a DFG Species of Special Concern.~~ In the desert areas, this species is found almost entirely in mine adits which exhibit a specific temperature and humidity range.

3. Signs of larger mammals observed in the area included old ~~wild~~ feral burro *(Equus asinus)* scat at the base of the mountains and bighorn sheep droppings. Mountain lions *(Felis concolor)* and mule deer *(Odocoileus hemionus)* were not observed during the surveys, but are also expected to inhabit the vicinity.

3.5.2.6 Local Protected or Special Interest Wildlife Species

1. Extensive ~~focused studies and~~ field surveys were conducted at the project site that focused on the potential occurrence of protected or special interest wildlife species. ~~to evaluate sensitive species which may occur on the project site~~. This section summarizes the findings and conclusions of these studies.

3.5.2.6.1 Desert Tortoise

1. As noted in Section 3.5.1.2.1, the ~~The~~ desert tortoise is a federally listed threatened species and a DFG threatened species. The initial general wildlife survey for the proposed project, which focused on assessing potential use of the site by ~~sensitive~~ protected or special interest species, was conducted between April 30 and August 20, 1989, the period during which the desert tortoise is most likely to be active (Brown, 1989). No tortoise, scat, tracks or carcasses were observed. Seven burrows that could have been from desert tortoise were noted within the study area, with the greatest number in the sandy habitat in the southwest corner of the site.

2. Because of the burrows, a survey specifically for tortoise was conducted covering the entire site and a three-mile radius outside the site. This study was performed in accordance with the FWS survey protocol (NECI, 1992). This work revealed no tortoise or desert tortoise sign. The report concluded that the project site is not inhabited by the desert tortoise.

3. Because of the report of burrows in the initial general wildlife survey conducted for the project in 1989 and negative finding of the 1992 tortoise survey, BLM requested a third study. This third study (Rado, 1994) was conducted in March 1994 and focused on the area of the site where the burrows were initially reported, wash areas, and other portions of the site with the

highest potential to provide habitat for the desert tortoise. Results of this third survey were also negative. No evidence of current or prior use of the site by desert tortoise was observed. The report on this survey concluded that the project site does not provide habitat for the desert tortoise and, therefore, the desert tortoise should not be affected by planned activities. These results corroborate the negative finding of the 1992 study and are supported by the BLM's habitat map, which shows the project site to be several miles northeast of desert tortoise range.

4. Desert tortoises are not known to occur in the vicinity of the offsite microwave station. The biological survey of this area confirmed that tortoise do not inhabit the microwave station site. No tortoise or sign were detected during the survey of the microwave area.

3.5.2.6.2 Mohave Ground Squirrel

1. The Mohave ground squirrel is a Category 2 federal candidate species and a California state-listed threatened species. Trapping surveys were conducted on the project site in 1989 (Brown) and in 1993 (EremiCo). The 1993 survey was conducted in consultation with the DFG. Compared to 1989, which was a drought year, 1993 was an above-average vegetation year in which, if present, the Mohave ground squirrel could be anticipated to be captured.

2. Mohave ground squirrels were not captured in either the 1989 or 1993 surveys, and none were reported to have been observed or sign detected in any of the numerous wildlife studies. The 1993 trapping survey included seven consecutive days, a total of approximately 13,800 trap hours. Conversations with the DFG personnel and the Mohave Ground Squirrel Working Group members resulted in a general consensus that the squirrels must not inhabit this portion of the Panamint Valley. The project site is approximately two miles north of the recently modified range boundary for this species (DFG, 1993).

3. Mohave ground squirrels or sign were not detected pursuant to the biological inventory of the offsite microwave repeater station area. The microwave station is located within the expected range of the Mohave ground squirrel.

3.5.2.6.3 Bighorn Sheep

1. While the ~~desert~~ bighorn sheep is not currently listed as threatened or endangered, it is ~~fully~~ protected under California law as discussed in Section 3.5.1.2.3. In the 1989 wildlife survey, ~~desert~~ bighorn sheep pellets were found in the ~~mountain areas encompassed in the~~ study area,

with large ~~great~~ concentrations in Redlands Canyon, especially around Redlands Spring (Brown, 1989). In a follow-up ~~focused 1992~~ survey ~~for the desert~~ of bighorn sheep, their presence and use of Redlands Canyon ~~the area~~ was confirmed (Weaver, 1992). Two ewes were observed about 1.5 miles north of Redlands Spring, and sign was ~~were~~ observed between 3,000 feet and 5,500 feet on the ridge, on the south-facing aspect above Redlands Spring.

2. The report for the 1992 survey by Weaver concluded that the Redlands Spring area and the adjacent steep slopes are vital to ~~the desert~~ bighorn sheep. ~~Further, a~~ All steep slopes above 3,000 feet within two miles of Redlands Spring were classified as important (Weaver, 1992). All ~~of these~~ areas specified as important bighorn sheep habitat by Weaver are outside the Briggs Project site boundary.

3. As discussed in Section 2.2.2.7.4, Canyon has installed a time-lapsed video camera at Redlands Spring to monitor use of the spring by bighorn sheep. Records of this monitoring for the period of December 1992 through March 1994 confirm that the spring is routinely used by bighorn sheep. The most frequent sightings occurred in summer 1993. Videos taken during this period recorded intermittent use of the spring by one to eight ~~individual~~ sheep at a time.

4. ~~While habitat that is vital to the bighorn sheep is east of the project, the~~ The project site is also known to be used by ~~the~~ bighorn sheep on occasion. A historic owner of the Briggs claim observed 15 bighorn sheep at the top of Manly Fall at a seep caused by a leak in a waterline installed for exploration activities (Brown, 1989). During ~~one of~~ the 1989 ~~wildlife~~ surveys by Brown, a bighorn ram attempted to enter ~~the surveyor's~~ her camper at the base of Manly Fall. ~~exhibiting no sign of fear to~~ The ram was not fearful of human presence (Brown, 1989).

5. As discussed in Section 2.2.2.7.4, as part of the Proposed Action, Canyon has agreed to participate in a program to monitor the presence and movement of bighorn sheep in the project vicinity. This program would occur as a combined effort of BLM, NPS and DFG. An outline for the monitoring program is provided in Appendix G.1. BLM, in consultation with NPS and DFG, has identified boundaries for the study area, as shown in Figure 3.5.1. The area includes the southern Panamint Range west of the ridgeline between Surprise and Goler canyons. The NPS feels that the monitoring program is vital as discussed in their letter in Appendix G.2.

6. NPS has identified six springs in the study area that are most important to the bighorn sheep: three in Pleasant Canyon, one in South Park Canyon, one in Goler Canyon, and Redlands

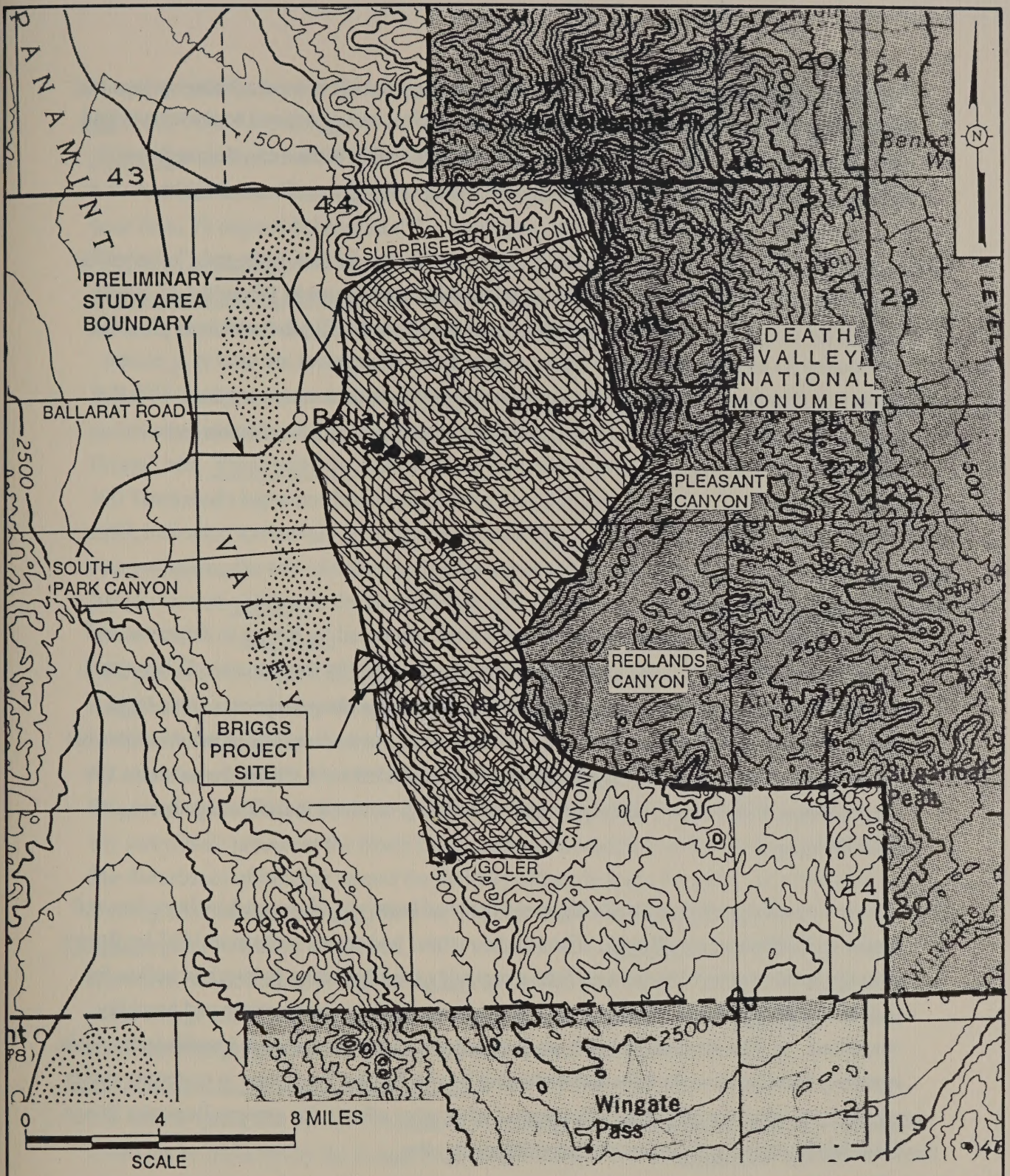


FIGURE 3.5.1

PRELIMINARY STUDY AREA BOUNDARY FOR BIGHORN SHEEP MONITORING PROGRAM

BRIGGS PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

Spring located east of the project site. The bighorn sheep habitat at most of these springs has been impacted by the presence of nearby roads, recreation, ~~and~~ or mineral exploration ~~or~~ and development ~~activity~~. NPS has indicated that Redlands Spring is the exception, and is considered the only one of these six springs providing relatively undisturbed habitat.

7. NPS considers areas of the Panamint Range with slopes steeper than 11 degrees to be habitat for the bighorn sheep. This includes most of the study area shown in Figure 3.5.1. While slopes over 11 degrees are considered habitat, the sheep are thought to favor areas proximal to slopes of 32 degrees or steeper. ~~These very s~~ Steep slopes ~~areas~~ are used ~~to~~ as escape routes ~~from predators~~. Slopes of this steepness occur throughout most canyons within the preliminary study area and over much of the terrain between Redlands Canyon and Goler Canyon.

3.5.2.6.4 Bats

Townsend's Big-Eared Bat

1. In 1993, ~~W~~winter, spring and summer surveys were conducted by Brown to determine ~~and study~~ the use of the project site and surrounding ~~vicinity~~ areas by the Townsend's big-eared bat, ~~an~~ FWS Category 2 ~~federal~~ candidate ~~for threatened or endangered status~~ and a DFG Species of Special Concern. In most areas of California, the decline in populations of this bat has been due in part ~~due~~ to its high sensitivity to roost disturbance. In the desert areas, this species is now found almost entirely in mine adits which exhibit a specific temperature and humidity range.

2. A maternity colony of Townsend's big-eared bats ~~had been~~ was discovered in ~~the spring and summer~~ a 1989 survey by Brown. The ~~separate~~ winter and spring surveys in 1993 by Brown were designed to determine the use of ~~the~~ mines adits for hibernating (winter) as well as for ~~maternal~~ maternity roosts (spring), uses which require different temperature and humidity conditions. In ~~T~~the summer of 1993, ~~work included a tagging program to identify individuals maternity roosting at onsite adits and evaluating~~ Brown banded bats found in maternity roosts within the proposed project site and evaluated other mine adits in the western Panamint Range ~~for suitability~~ as potential alternate maternity roosts ~~sites~~.

3. The Townsend's big-eared bat migrates to higher elevations to hibernate where temperatures are lower. ~~elevationally to locate suitable hibernals, usually higher elevations with low, constant temperatures. The bat periodically moves from one hibernal to another and will~~

~~forage and drink when possible during this time~~. In the winter survey by Brown (January 1993), no bats of any species were found in the ten mines adits entered in the vicinity of the proposed project site ~~vicinity~~. ~~The Townsend's big-eared bat roosts in the open and would have been apparent. Since t~~ Temperatures taken in the mines adits during the survey ranged from 66 to 73 degrees Fahrenheit (°F). ~~, and previous observations indicated that these~~ Townsend's big-eared bats hibernate in ~~cooler~~ temperatures less than 65°F, indicating that the mine adits within the proposed ~~the results indicate that the mines at the~~ project site are too warm for ~~the~~ hibernating Townsend's big-eared bats (Brown, 1993a).

4. ~~Based on the site work conducted,~~ Brown's studies show maternity ~~roosting~~ roosts primarily occurs at two locations within the proposed project site: the "Briggs" adit and the "North Briggs" adit. These adits are located within the perimeter of the proposed mine pit. Nearly 100 Townsend's big-eared bats were observed ~~at~~ emerging from the Briggs adit on April 23, 1993, indicating a relatively large maternity ~~roost~~ colony. ~~Three days later, only 25 bats were counted leaving the adit. Another maternity site of about~~ Approximately 100 ~~of the~~ bats were ~~was~~ discovered utilizing ~~in~~ the North Briggs ~~adit~~ and a connecting adit as a maternity roost.

5. As a part of the summer 1993 study, Townsend's big-eared bats at the Briggs and North Briggs adits were captured using hand nets and tagged with color-coded and numbered bands for identification. Different colors were used for each of the two adits. Banding occurred on the afternoon of August 13, 1993. One hundred eighteen out of 121 individuals present at the Briggs adit were banded (three escaped before banding). One hundred nineteen out of 121 individuals present at the North Briggs adit were banded (two escaped before banding). The disturbance of banding caused the majority of bats to leave the roost. The following evening, a bat census indicated that over 200 bats had found alternate roost sites. A subsequent census on August 26, 1993, indicated that about 160 bats were still roosting elsewhere. Color coding of tags on the bats spotted indicated that there is interchanging use of the Briggs and North Briggs adits, probably indicating that the bats from the two adits constitute a single population and may regularly switch roost sites.

6. The winter, spring and summer bat studies also focused on surveying selected adits offsite that would not be impacted by the Briggs Project to locate potential alternate roosting sites. Selected adits were investigated along the western flank of the southern Panamint Range, primarily below an elevation of about 3,000 feet. Several possible alternate maternity roost sites were located. A large colony of Townsend's big-eared bats was located at two adits near a spring in Jackpot Canyon about seven miles north of the Briggs Project site. Another, smaller maternity

colony was located on mine claims about eight miles to the north. A series of adits located about 3,000 feet south of Redlands Canyon and outside of the Briggs Project site appeared to have suitable conditions for maternity roosting. Large amounts of *Plecotus* guano were observed, indicating historical use, but there is little recent (post 1989) guano deposition, and only a few *Plecotus* were observed during the 1993 surveys. Several other mines were observed with apparent limited use as maternity roosts for Townsend's big-eared bats.

7. ~~The o~~ Offsite ~~investigations that occurred~~ surveys conducted after the banding of bats at the Briggs site revealed ~~very~~ few ~~of the~~ bats that had relocated from the Briggs adits after the banding disturbance. ~~The spring 1993 study concluded that there must be unknown roosts in the vicinity.~~ Bats may have relocated to unknown roosts in the vicinity. It is not known at this time if or where there is an alternate maternity roost site. Bats could have failed to breed in 1994. Bats may fail to reproduce if stressed or if an adequate roost site is not located.

Pallid Bat

1. Pallid bats are known to occur in the project area. During the June 1989 wildlife survey by Brown, several pallid bats were observed flying just above the vegetation at Redlands Spring. In the spring of 1993, five pallid bats were found night roosting at the lower Briggs adit located at the base of Manly Fall. Since the pallid bats have been observed at this location on several occasions, this adit was concluded to be a night roost for this species (Brown, 1995). This adit has subsequently been sealed. The inedible portions of prey items and the distinctive guano of this bat were also present in several adits within the proposed project site.

Mastiff Bat

1. This bat is not known to occur in the Panamint Range. The distinctive audible cries of single bats were heard on two nights during the spring 1993 survey. It is likely that the bats were in transit, and it is not believed that a major roost exists in the vicinity of the project site (Brown, 1993).

3.5.2.6.5 Panamint Alligator Lizard

1. Redlands Spring and associated moist areas within Redlands Canyon represent the most suitable habitat near the project area for this species, although this lizard has occasionally been found in drier habitats. Searches of the Redlands Spring area in June and August 1989 did

not locate this species (Brown, 1989). As noted in Section 3.5.1.2.5, the closest known occurrence of the Panamint alligator lizard is approximately 12 miles to the north in Surprise Canyon. ~~The Panamint alligator lizard is a DFG Species of Special Concern and a Category 2 federal candidate species. This relict species has been found near isolated springs and water sources in the White and Inyo mountains, and the Argus and Panamint ranges. According to the DFG Natural Diversity Data Base, the closest known occurrence of this species to the project site is Surprise Canyon, approximately 12.5 miles to the north. This lizard ranges from scrub desert and Joshua tree habitat up into the lower edge of the pinon-juniper belt and prefers areas of rockslides and dense plant growth near water. The Redlands Spring area represents the most suitable nearby habitat onsite for this lizard. Searches in the area did not locate this species.~~

3.5.2.6.6 Chuckwalla

1. A single individual chuckwalla was observed at the project site (JBR, 1991). ~~This species was listed as a Category 2, federal candidate species in 1991. The chuckwalla is a widespread species, but is collected heavily for the pet trade.~~ It was encountered at the Panamint Range front, south of Redlands Canyon.

3.5.2.6.7 Burrowing Owl

1. A burrowing owl nesting area was located by DFG in May 1993 near the road from State Highway 178 to Ballarat (EremiCo, 1993c). This area is approximately 0.5 miles from the north borrow area near Ballarat. ~~The~~ As noted in Section 3.5.1.2.7, the burrowing owl is a ~~California~~ DFG Bird Species of Special Concern ~~Second Priority,~~ and is considered a rare and declining species in Inyo County.

3.5.2.6.8 Prairie Falcon

1. Prairie falcons are known to nest on cliffs on the western slope of the Panamint Range and forage over a large area. A number of sitings are included for the Manly Fall quadrangle in DFG's natural diversity database. Most recently, DFG staff observed a prairie falcon pair and two juveniles roosting at Manly Fall during August 1993 (DFG, 1995).

3.5.2.6.9 Le Conte's Thrasher

1. A breeding pair of Le Conte's thrashers was observed within the project boundary in May 1993 (LaBerteaux, 1993). The nest was in a creosote bush and contained three eggs. The species was not observed in other biological surveys conducted for the Briggs project.

3.5.2.6.10 Ferruginous Hawk

1. A ferruginous hawk was observed at the site during the 1989 wildlife survey (Brown, 1989). Rocky ridges surrounding canyons in the upland habitat provide perching and nesting sites for raptor species (LaBerteaux, 1989).

3.5.2.6.11 Short-Eared Owl

1. The short-eared owl would be expected to be present during the intermigratory fall and/or winter periods (LaBerteaux, 1989). In August 1993, a short-eared owl carcass was found below Manly Fall by Brown and Denyse Racine, a biologist from DFG.

3.5.2.6.12 Yellow Warbler

1. The yellow warbler (*Dendroica petechia*) was observed at the project site during the May/June 1989 wildlife survey (Brown, 1989). This species breeds from mid-April to August, with peak activity in June. The project area is within its breeding range (DFG, 1995b).

~~3.5.2.6.10~~ 3.5.2.6.13 Giant Fairy Shrimp

1. As noted in Section 3.5.2.3, the giant fairy shrimp is on the DFG Special Animal list. The giant fairy shrimp are known ~~from~~ to occur only in eight sites in California, seven of which are located in a 160 kilometers by 50 kilometers swath down the middle of Mojave Desert. The closest known populations to the project site are at China Lake and Mirror Lake, both in Indian Wells Valley, approximately 30 miles to the southwest. The December 1993 survey of standing water along the eastern playa edge revealed no fairy shrimp (any species). No giant fairy shrimp are known to occur in the Panamint Valley (EremiCo, 1993c).

3.6 AIR QUALITY

3.6.1 REGIONAL AIR QUALITY

3.6.1.1 Regional Climatic and Meteorological Conditions

1. The Briggs Project site is located in the southern portion of the Great Basin Valleys Air Basin (Air Basin), along the western flank of the Panamint Range. The climate of the region is generally hot and dry in the summer and cool in the winter, with limited precipitation and cloudiness.

2. From late fall to early spring, average daytime temperatures are moderate, averaging 60° to 85°F. Nights are cooler, with temperatures averaging 40° to 60°F. Winter temperatures are occasionally below freezing, and can be lower than 10°F. During the summer, temperatures are often 100° to 110°F during the day and about 80°F at night.

3. Winds in the region have seasonal and daily variability. Mean wind speeds are highest from April through June, and peak daily winds speeds during this period occur in the mid to late afternoon. Mean wind speeds exceed 15 mph during these periods.

4. The predominant wind direction at stations in the southern part of the Air Basin is from the southerly sectors (SW, SSW, S, SSE and SE). At China Lake, the southerly and southwesterly components are predominant. There is also a relatively high frequency of winds from the north, presumably resulting from drainage of cooler air as it descends through the valleys from higher elevations.

3.6.1.2 Regional Ambient Air Quality

1. The air quality in the Panamint Valley is generally good. The area is in attainment or unclassified (due to a lack of data) for all NAAQS. Federal and state air quality regulations are further discussed in Section 3.6.3.

2. As the project site is in a remote area of southeastern California, there are very few nearby industrial sources of air pollutants. The nearest industrial sources are approximately 20 miles southwest of the site in the Trona area (in Searles Valley). The emissions from the Trona area are not expected to impact the project area. Other nearby sources of emissions include Owens Lake Soda Ash Company, China Lake Naval Air Weapons Station (CLNAWS) and the Panamint Valley Limestone Quarry (see Chapter 5.0 for discussion of these sources.)

3. Within the region, there are several federally designated nonattainment areas (geographic regions that have been classified as having ambient air quality levels of one or more criteria pollutants that exceed NAAQS) for PM_{10} and O_3. Federal PM_{10} nonattainment areas include the Owens Valley, Mammoth Lakes, Mono Basin, and the Searles Valley Planning Area (SVPA). In addition, Kern County is nonattainment for O_3. Mono County O_3 levels have exceeded the NAAQS; Mono County may be designated nonattainment for O_3 in the future. The SVPA is also nonattainment for state H_2S and particulate sulfate standards. Of these nonattainment areas, only the SVPA is near the project site. The SVPA is west of the Panamint Valley on the opposite side of the Slate Range.

4. Baseline concentration measurements of NO_x, SO_2 and CO are not available from any rural locations near the site. These three pollutants are produced by natural sources only in small amounts. Combustion processes are the primary sources of these pollutants in the atmosphere. Elevated concentrations are found near large combustion sources or urban areas where there is a high density of vehicles. From the EPA criteria reports on SO_2 (EPA, 1981) and CO (EPA, 1979), background concentrations in non-urban areas are usually at or below detection limits of standard ambient monitoring equipment. This is also likely to be true for NO_x.

5. O_3 baseline information for the region is also not available. However, limited evidence suggests long-range transport of O_3 from distant air basins such as the Los Angeles basin, and possibly the San Joaquin Valley, may occur and influence regional O_3 concentrations.

6. Particulate matter in the air and PM_{10} can be generated by natural sources such as wind erosion, and anthropogenically by combustion and other processes. Given the arid climate and sparse vegetation characteristic of the region, natural wind erosion is likely a strong source of PM_{10} in the area.

7. There is also evidence of limited natural hydrogen sulfide (H_2S) emissions. H_2S is produced naturally as a by-product of anaerobic metabolism. The limited ground water drainage in the dry lakebeds of Panamint, Owens, and Searles valleys can promote anaerobic conditions in shallow soils. The H_2S produced diffuses upward and is eventually released to the air to cause low level concentrations in localized areas. These emissions can be increased if the soil is disturbed, for example, during excavation.

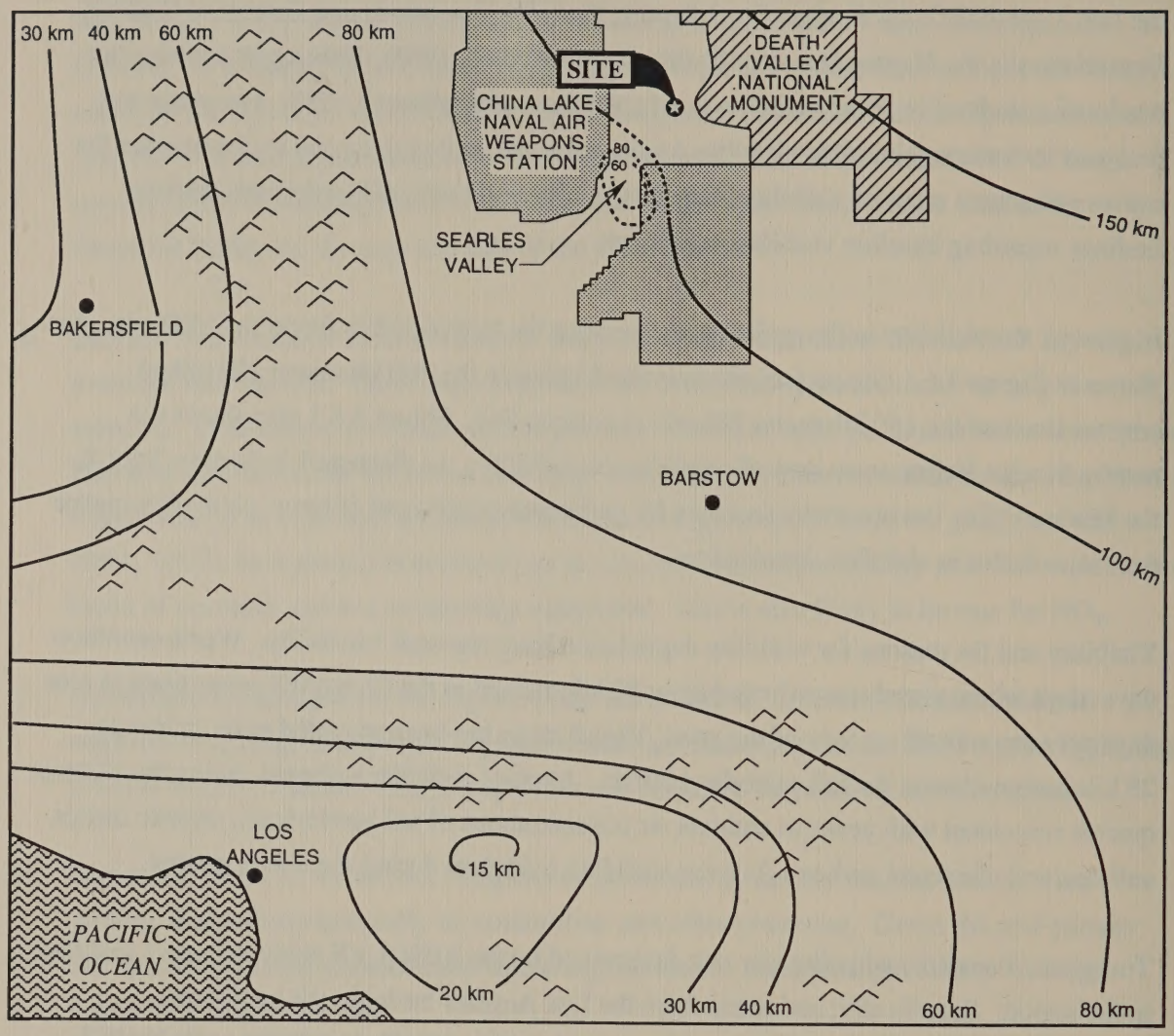
3.6.1.3 Regional Visibility

1. Regional visibility has been identified as an important consideration for DVNM and CLNAWS. Baseline visibility conditions presented in this EIS/EIR are based on information contained in the July 1988 *RESOLVE Project Final Report, Visibility Conditions and Causes of Visibility Degradation in the Mojave Desert of California* (CLNAWS, 1988). This report contains the results of a study of regional visibility conducted from 1983 through 1988. The study was designed to document baseline visibility conditions in the study region and to characterize the causes and source areas of visibility degradation. The following discussion summarizes findings regarding baseline visibility conditions.

2. In general, the visibility in the project area is among the best visibility found in California. As shown in Figure 3.6.1, the project site is located between the 100 kilometer (60 miles) contour line and the 150 kilometer (90 miles) contour line. Figure 3.6.1 also shows the nearby Searles Valley as an area of much lower visibility. As discussed in Section 3.6.1.2, the Searles Valley is a nonattainment area for particulate matter, and airborne particulate matter is a major factor in visibility degradation.

3. Visibility and the reasons for visibility degradation have seasonal variability. Worst-condition days (days where visual range drops below 50 kilometers) at the CLNAWS occur three to nine days per season in all seasons of the year. Visual range has been recorded to be as low as 26 kilometers (during the fall calendar quarter). Average visibility is lowest during the summer quarter coincident with peaks in ambient air concentrations of soil particulates, organic matter, sulfates, and elemental carbon. Average visibility is highest during the winter quarter.

4. Transport of aerosol and pollutants was determined by the RESOLVE study to impact visibility in the region. Specifically, emissions from the Los Angeles basin (to the south) and, moreover, the San Joaquin Valley (to the west and northwest) affect visibility at CLNAWS. Roughly two-thirds of the visibility degradation in the RESOLVE study area was attributed to sources in the San Joaquin Valley. The balance is primarily from sources in the Los Angeles basin and local sources. The types of sources determined by the RESOLVE study to affect visibility in the region include natural emissions of soil dust, emissions from motorized vehicles, and petroleum production and refining.



NOTE: CONTOURS REPRESENT DISTANCE TO 2 PERCENT CONTRAST AND AVERAGE EXTINCTION LEVELS.

LEGEND

- MOUNTAINS
- NAVAL WEAPONS TESTING AREA
- DEATH VALLEY NATIONAL MONUMENT
- 15 km — VISUAL RANGE CONTOUR IN KILOMETERS (DASHED WHERE UNCERTAIN)

0 30 60 MILES

APPROXIMATE SCALE

REFERENCE: ADAPTED FROM CLNAWS, 1988.

FIGURE 3.6.1

VISUAL RANGE CONTOURS (IN KILOMETERS)

BRIGGS PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

3.6.2 LOCAL AIR QUALITY

3.6.2.1 Local Climatic and Meteorological Conditions

1. Meteorological data was collected at the project site between December 1991 and November 1992. The meteorological parameters monitored at the site include wind speed, wind direction, temperature, relative humidity, and precipitation. A complete summary of the methods and data is presented in the *Annual Meteorological and Air Quality Data Report, Briggs Project* (Air Sciences, Inc., 1993). This report is hereby incorporated by reference.

2. The wind data are summarized in Table 3.6.1. A wind frequency diagram (wind rose) generated using onsite data is provided in Figure 3.6.2. According to these data, the mean wind speed is approximately 6.3 mph and the predominant wind directions are along the axis of the mountains (i.e., from the south-southeast and south).

3. Table 3.6.2 shows a frequency distribution of winds by speed during each month of the period that onsite monitoring was conducted. The purpose of this table is to indicate periods of gustiness, which is a condition that results in marginal mixing but which can also have a pronounced effect on the natural generation of airborne dust. The data in Table 3.6.2 show that the warmer months of April through September 1992 were the months with the higher wind speeds (i.e., the percentage of speeds less than 10 mph was lower during April through September than for the other months). The frequency of high speed winds was lower during November 1991 through January 1992, but during the few occasions of high speed winds, gusts were still strong. Maximum wind speeds for each month during the period of December 1991 through November 1992 exceeded 30 mph, and the peak wind speed during the entire period was 46 mph, measured in July 1992.

4. The site-specific meteorological data have been used to characterize atmospheric stability conditions in the project area. Stability conditions influence the dispersion and mixing of air, and consequently the air quality impacts from project emissions. Stable conditions occur approximately 39 percent of the time. Stable conditions are characterized by low wind speeds during nighttime and early morning, before development of the daily temperature inversion. Stable conditions do not promote mixing and dispersion. Unstable conditions occur at the Briggs Project site approximately 28 percent of the time. Unstable conditions result in the greatest degree of mixing and dispersion. Neutral stability conditions, characterized by high speed winds during the day or night, occur 32 percent of the time. Neutral stability results in moderate mixing and dispersion.

TABLE 3.6.1

FREQUENCY OF WINDS BY DIRECTION AND SPEED
DECEMBER 1991 - NOVEMBER 1992
(PERCENT OF OCCURRENCE)

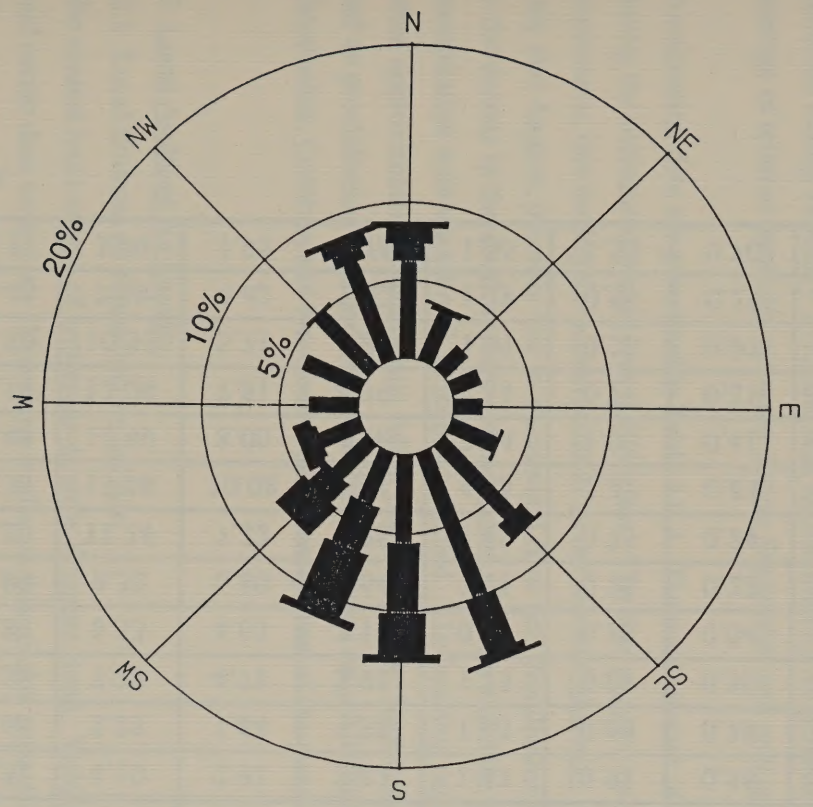
DIRECTION	SPEED CLASS INTERVALS (mph)[1]							MEAN SPEED
	1-4	4-7	7-12	12-18	18-24	≥24	ALL[2]	
N	3.2	2.9	1.0	0.9	0.3	0.1	8.3	6.1
NNE	1.9	1.3	0.2	0.2	0.0	0.0	3.7	4.4
NE	1.5	0.5	0.0	0.0	0.0	0.0	2.1	3.2
ENE	1.4	0.6	0.1	0.0	0.0	0.0	2.1	3.3
E	1.2	0.7	0.1	0.1	0.1	0.0	2.2	4.8
ESE	1.7	1.4	0.2	0.2	0.1	0.0	3.5	4.6
SE	2.5	3.8	1.1	0.4	0.1	0.0	7.8	5.3
SSE	3.0	6.7	3.6	2.6	0.3	0.0	16.2	7.2
S	2.2	3.3	4.4	4.3	0.5	0.0	14.6	9.1
SSW	1.5	1.9	3.0	2.5	0.5	0.0	9.5	9.2
SW	1.3	1.7	1.5	1.1	0.0	0.0	5.7	7.2
WSW	1.4	1.3	0.2	0.1	0.0	0.0	3.0	4.1
W	1.9	1.3	0.1	0.0	0.0	0.0	3.3	3.6
WNW	2.7	1.4	0.1	0.0	0.0	0.0	4.2	3.3
NW	3.0	1.8	0.3	0.1	0.0	0.0	5.1	3.7
NNW	3.8	2.8	0.6	0.7	0.5	0.1	8.5	6.1
ALL[2]	34.3	33.3	16.6	13.1	2.3	0.2	99.9	6.3

92-274 (8/13/94/pm)

Source: Air Sciences, Inc., 1993.

(1) Intervals shown are rounded from those provided in Air Sciences, Inc., 1993, which are given in knots.

(2) Sum of individual values may not equal the totals shown due to rounding.



WIND SPEED LEGEND (mph)



1.5 - 6.4

6.4 - 11.3

11.3 - 16.1

16.1 - 21.0

>21.0

NOTE: WINDS LESS THAN 1.5 MPH ARE NOT SHOWN, BUT OCCUR LESS THAN 0.1 PERCENT OF THE TIME.

FIGURE 3.6.2

WIND ROSE

BRIGGS PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

TABLE 3.6.2

FREQUENCY OF WIND SPEEDS BY MONTH (PERCENT)

MONTH	SPEED INTERVAL (mph)									
	<10	10-13	13-16	16-19	19-22	22-25	25-28	28-31	31-34	≥34
December 1991	87.32	4.10	2.91	2.22	1.47	0.97	0.56	0.29	0.12	0.03
January 1992	92.66	2.23	1.64	1.32	1.03	0.60	0.28	0.15	0.06	0.02
February 1992	81.58	7.78	4.71	2.91	1.73	0.89	0.30	0.09	0.00	0.00
March 1992	83.82	8.53	4.63	2.13	0.67	0.15	0.04	0.02	0.00	0.00
April 1992	75.99	9.32	6.80	4.64	2.21	0.76	0.22	0.04	0.00	0.00
May 1992	73.20	12.24	7.22	4.25	1.88	0.75	0.24	0.11	0.06	0.02
June 1992	61.35	13.28	10.08	7.51	4.45	2.27	0.83	0.19	0.02	0.00
July 1992	70.48	12.49	8.00	4.96	2.34	1.00	0.41	0.19	0.06	0.03
August 1992	72.18	12.08	7.81	4.79	2.11	0.71	0.21	0.06	0.01	0.00
September 1992	79.70	10.33	5.71	2.85	1.01	0.26	0.07	0.03	0.01	0.00
October 1992	83.46	7.59	4.42	2.42	1.19	0.55	0.23	0.09	0.02	0.00
November 1992	89.15	3.09	1.95	1.76	1.65	1.33	0.70	0.29	0.07	0.00

92-274 (8/12/94/lk)

Source: Air Sciences, Inc., 1993.

5. The average daily temperature during the period of December 1991 to November 1992 was 74°F. August had the highest monthly average temperature for the period (96°F) and January had the lowest monthly average temperature (48°F). The recorded maximum hourly average temperature for the period was 114°F, and occurred on the afternoon of August 12, 1992. The lowest hourly average temperature was 30°F and occurred on the morning of December 16, 1991.

6. The average relative humidity during the monitored period was 27 percent and ranged from 4.7 percent to greater than 94 percent. The highest monthly average of relative humidity occurred during February 1992 and was approximately 54 percent. The lowest monthly average of relative humidity occurred during September and was approximately 10 percent.

7. Precipitation data are presented in Table 3.6.3. The total amount of precipitation collected during the monitored period was 6.24 inches. The data suggest two modes of rainfall occurrence, one during the winter, similar to the rest of California, and a second during July and August, possibly due to monsoonal flow and thunderstorms which are common to the deserts in the southwestern United States. February had the greatest amount of precipitation with a total of 2.32 inches collected. The heaviest rainfall occurred during July, when approximately 1 inch of rain fell in one hour. June, September, and November 1992 had no precipitation recorded. October 1992 recorded only 0.01 inch making the last quarter (September, October, and November) the driest quarter of the year.

3.6.2.2 Local Ambient Air Quality

3.6.2.2.1 Local Sources of Emissions to the Air

1. The nearest local source of emissions to air is Wingate Road. Vehicles traveling along this dirt road create dust emissions. Non-mine traffic on this road is expected to remain at less than 25 vehicles per day. Since there are no stationary combustion sources near the project site, the NO_x, SO_2 and CO baseline concentrations at the site are expected to be well below the EPA de minimis levels (14 mg/m^3, annual average for NO_x; 13 $\mu g/m^3$, 24-hour average for SO_2; and 575 mg/m^3, 8-hour average for CO). In addition, there are no nearby sources of reactive organic gases (ROG) which, along with NO_x, is a precursor to O_3. Therefore, although long-range transport of O_3 from the Los Angeles area has been suggested as a source of O_3 in the Air Basin, it is unlikely that baseline O_3 concentrations are elevated in the site vicinity.

TABLE 3.6.3

MONTHLY PRECIPITATION TOTALS
(inches)

MONTH/YEAR	MONTHLY TOTAL	HOURLY MAXIMUM	DAILY MAXIMUM
December 1991	0.69	0.18	0.38
January 1992	0.33	0.09	0.16
February 1992	2.32	0.33	0.86
March 1992	1.39	0.15	0.63
April 1992	0.06	0.02	0.06
May 1992	0.17	0.09	0.17
June 1992	0.00	0.00	0.00
July 1992	1.00	0.99	0.99
August 1992	0.27	0.23	0.24
September 1992	0.00	0.00	0.00
October 1992	0.01	0.01	0.01
November 1992	0.00	0.00	0.00
TOTAL FOR PERIOD	6.24	--	--
MAXIMUM FOR PERIOD	--	0.99	0.99

92-274 (8/12/94/lk)

Source: Air Sciences, Inc., 1993.

3.6.2.2.2 Particulate Matter

1. Measurements of PM_{10} in the ambient air at the project site were made during the period from December 1991 to November 1992. The particulate data collected onsite are presented in Table 3.6.4. The maximum 24-hour PM_{10} concentration was 43 $\mu g/m^3$; the arithmetic mean for the period was 16.0 $\mu g/m^3$; and the geometric mean was 12.5 $\mu g/m^3$. Four months (May, June, August, and September 1992) had arithmetic monthly means exceeding 20 $\mu g/m^3$. These four months are characteristically dry and windy. The highest monthly average was 27 $\mu g/m^3$ for the month of August 1992, which is one of the drier and windier months of the year.

2. Baseline PM_{10} concentrations were compared with wind speed conditions during the ten highest and ten lowest measured PM_{10} concentration days to further define sources of PM_{10} at the project site. The analysis indicates that all high PM_{10} concentration days had at least five to seven hours of wind with speeds over 11 mph, and the highest PM_{10} concentration days are associated with wind speeds ranging from 11 to 24 mph. In contrast, the lowest daily PM_{10} concentrations occurred during periods of very low wind speed, generally ranging from 3 to 10 mph. The PM_{10} concentrations during low wind speed conditions are generally less than 6 $\mu g/m^3$.

3. Given the strong relationship between PM_{10} concentration and wind speed, separate baseline concentrations of PM_{10} were determined for high speed wind conditions and all other wind speed conditions. Under high speed wind conditions (i.e., greater than 11 mph average wind speed), the maximum measured PM_{10} baseline is 43 $\mu g/m^3$. The maximum measured PM_{10} baseline for all other wind speed conditions is 29 $\mu g/m^3$. In the analyses of impacts in Chapter 4.0, 29 $\mu g/m^3$ is used to represent baseline PM_{10}, 24-hour concentrations. The 43 $\mu g/m^3$, 24-hour baseline PM_{10} concentration is used only in the analysis of high wind speed impacts.

3.6.3 AIR QUALITY REGULATIONS AND STANDARDS

3.6.3.1 Clean Air Act

1. The NAAQS are minimum allowable air quality levels designated as part of the Clean Air Act. NAAQS have been established for NO_2, SO_2, CO, PM_{10} and O_3. There are primary and secondary NAAQS. The primary standards are intended to reflect levels of air quality deemed necessary to protect the public health and include an adequate margin of safety. The

TABLE 3.6.4

PM_{10} PARTICULATE CONCENTRATIONS
($\mu g/m^3$)

DAY	1991	1992										
	December	January	February	March	April	May	June	July	August	September	October	November
1	-	2	-	8	-	-	-	-	26	-	-	-
2	(1)	-	-	-	-	-	30	18	-	-	-	9
3	-	-	22	-	9	16	-	-	-	24	22	-
4	-	3	-	7	-	-	-	-	43	-	-	-
5	8	-	-	-	-	-	41	15	-	-	-	8
6	-	-	5	-	18	13	-	-	-	19	(1)	-
7	-	(1)	-	6	-	-	-	-	24	-	-	-
8	(1)	-	-	-	-	-	29	14	-	-	-	14
9	-	-	4	-	20	39	-	-	-	24	19	-
10	-	5	-	7	-	-	-	-	21	-	-	-
11	7	-	-	-	-	-	33	23	-	-	-	5
12	-	-	3	-	9	22	-	-	-	26	12	-
13	-	11	-	16	-	-	-	-	24	-	-	-
14	4	-	-	-	-	-	20	17	-	-	-	16
15	-	-	5	-	(1)	29	-	-	-	17	31	-
16	-	4	-	23	-	-	-	-	22	-	-	-
17	5	-	-	-	-	-	18	22	-	-	-	18
18	-	-	5	-	24	21	-	-	-	21	25	-

Source: Air Sciences, Inc., 1993.

(1) Indicates invalid or missing data.

TABLE 3.6.4

PM_{10} PARTICULATE CONCENTRATIONS
($\mu g/m^3$)
(Continued)

DAY	1991	1992										
	December	January	February	March	April	May	June	July	August	September	October	November
19	-	4	-	12	-	-	-	-	14	-	-	-
20	21	-	-	-	-	-	26	17	-	-	-	15
21	-	-	5	-	30	19	-	-	-	21	21	-
22	-	8	-	5	-	-	-	-	36	-	-	-
23	4	-	-	-	-	-	16	21	-	-	-	3
24	-	-	3	-	27	19	-	-	-	29	8	-
25	-	7	-	5	-	-	-	-	32	-	-	-
26	3	-	-	-	-	-	23	24	-	-	-	6
27	-	-	4	-	19	26	-	-	-	17	9	-
28	-	4	-	6	-	-	-	-	34	-	-	-
29	4	-	-	-	-	-	18	(1)	-	-	-	2
30	-	-	-	-	29	27	-	-	-	17	5	-
31	-	5	-	7	-	-	-	-	20	-	-	-
Arithmetic Mean	7	5	6	9	20	23	25	19	27	21	17	10
Geometric Mean	6	5	5	8	19	22	24	18	26	21	14	8
Maximum	21	11	22	23	30	39	41	24	43	29	31	18
Number of obs.	8	10	9	11	9	10	10	9	11	10	9	10

Source: Air Sciences, Inc., 1993.

(1) Indicates invalid or missing data.

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secondary standards reflect the levels of air quality necessary to protect public welfare from other known or anticipated adverse effects of a pollutant (such as adverse effects to crops, livestock, vegetation, and visibility).

2. Under the Clean Air Act, state and local authorities have been given primary responsibility for assuring that their respective regions are in attainment of, or had a verifiable plan to attain, the NAAQS. Each state is required by regulation (40 CFR Part 51) to promulgate an implementation plan to achieve this goal. The Clean Air Act also gives state and local agencies authority to promulgate more stringent ambient air quality standards. As discussed in Section 1.4.1.1, CARB has promulgated more stringent state standards (i.e., the CAAQS) under this authority, and designated nonattainment areas. The NAAQS and CAAQS are presented in Table 3.6.5, and are used as significance criteria for assessing potential air quality impacts in Section 4.6.

3. The Clean Air Act also provides New Source Performance Standards (NSPS) (40 CFR Part 60), National Emissions Standards for Hazardous Air Pollutants (NESHAP) (40 CFR Part 61), and measures for prevention of significant deterioration (PSD) of air quality. Of these three federal regulatory programs, only NSPS has applicability to the Briggs Project. The PSD regulations do not apply because the 250 tons per year (of any pollutant) point source emissions level that triggers these regulations for gold mining operations will not be exceeded. NESHAPs do not apply because these standards are for specific pollutants and processes that will not be included in the project activities.

4. NSPS identifies performance standards for certain equipment in specific types of service to promote maintenance of air quality standards. The sections of NSPS which are applicable to the Briggs Project are as follows:

   - **Subpart LL** applies to the crushers, screens, conveyor transfer points, storage bins (including surge bins and hoppers), and ore truck loading and unloading. Stack emissions are limited to 0.05 grains per dry standard cubic foot and an opacity level not to exceed 7 percent. Process fugitive emissions (particulate emissions from the above mentioned sources that are not collected by a capture system) are limited to 10 percent opacity.
   - **Subpart Kb** applies to the storage tanks for supplying generators and mobile equipment with diesel fuel. As the storage tanks would be larger than 40 cubic meters (approximately 10,000 gallons) and smaller than 75 cubic meters (approximately 20,000 gallons), NSPS requires readily accessible records of the tank's dimensions and analyses showing the capacities of each storage vessel.

TABLE 3.6.5

APPLICABLE AMBIENT AIR QUALITY STANDARDS

POLLUTANT	AVERAGING TIME	CALIFORNIA STANDARDS(1)		NATIONAL STANDARDS(2)		
		CONCENTRATION (3)	METHOD (4)	PRIMARY (3,5)	SECONDARY (3,4,6)	METHOD (7)
O_3	1 Hour	0.09 ppm (180 $\mu g/m^3$)	Ultraviolet Photometry	0.12 ppm (235 $\mu g/m^3$)	Same as Primary Standards	Ethylene Chemiluminescence
CO	8 Hour	9.0 ppm (10 mg/m^3)	Nondispersive Infrared Spectroscopy	9 ppm (10 mg/m^3)	–	Nondispersive Infrared Spectroscopy
	1 Hour	20 ppm (23 mg/m^3)		35 ppm (40 mg/m^3)		
NO_2	Annual Average	–	Gas Phase Chemiluminescence	0.053 ppm (100 $\mu g/m^3$)	Same as Primary Standards	Gas Phase Chemiluminescence
	1 Hour	0.25 ppm (470 $\mu g/m^3$)		–		
SO_2	Annual Average	–	Ultraviolet Fluorescence	0.03 ppm (80 $\mu g/m^3$)	–	Pararosoaniline
	24 Hour	0.04 ppm (105 $\mu g/m^3$)(8)		0.14 ppm (365 $\mu g/m^3$)	–	
	3 Hour	–		–	0.5 ppm (1300 $\mu g/m^3$)	
	1 Hour	0.25 ppm (655 $\mu g/m^3$)		–	–	
PM_{10}	Annual Geometric Mean	30 $\mu g/m^3$	Size Selective Inlet High Volume Sampler and Gravimetric Analysis	–	–	Inertial Separation and Gravimetric Analysis
	24 Hour	50 $\mu g/m^3$		150 $\mu g/m^3$	Same as Primary Standards	
	Annual Arithmetic Mean	–		50 $\mu g/m^3$		
Sulfate	24 Hour	25 $\mu g/m^3$	Turbidimetric Barium Sulfate	–	–	–
Lead	30 Day Average	1.5 $\mu g/m^3$	Atomic Absorption	–	–	Atomic Absorption
	Calendar Quarter	–		1.5 $\mu g/m^3$	Same as Primary Standards	

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(1) California standards for O_3, CO, SO_2 (1 hour), NO_2, PM_{10}, and visibility reducing particles are values that are not to be equaled or exceeded.

(2) National standards, other than O_3 and those based on annual averages or annual arithmetic means, are not to be exceeded more than once a year. The O_3 standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than one.

(3) Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 mm mercury. Measurements of air quality are corrected to a reference temperature of 25°C and a reference pressure of 760 mm mercury (1,013.2 millibar); ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

(4) Equivalent procedure, which can be shown to the satisfaction of CARB to provide equivalent results at or near the level of the air quality standard, may be used.

(5) National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect public health. Each state must attain the primary standards no later than three years after that state's implementation plan is approved by EPA.

(6) National Secondary Standards: The levels of air quality necessary to protect public welfare from any known or anticipated adverse effect of a pollutant. Each state must attain the secondary standards within a "reasonable time" after the state implementation plan is approved by EPA.

(7) Reference method as described by EPA. An "equivalent method" of measurement may be used, but must have a "consistent relationship to the reference method" and must be approved by EPA.

(8) At locations where state standards for oxidant and/or PM_{10} are violated. National standards apply elsewhere.

5. The 1990 amendments to the Clean Air Act included new regulatory programs for toxic air contaminants (termed "air toxics compounds") and for a federal permitting program. These new programs are defined in Title III and Title V of the Clean Air Amendments of 1990, respectively. While regulations for these programs are currently being developed, both programs are applicable to the Briggs Project. As is discussed in Section 4.6, the cyanide emissions from the processing circuit would be above trigger levels specified in Title III for applicability of Title V permitting requirements.

3.6.3.2 APCD Rules and Regulations

1. The APCD rules and regulations pertain to air pollution sources throughout Inyo, Mono, and Alpine counties. The APCD implements ten regulations, each composed of a number of specific rules. Several of these regulations contain rules that define the administrative procedures, fee schedule, and definitions of terms that apply to air pollution sources. Other regulations outline substantive requirements for sources of air pollutants and are summarized in Table 3.6.6.

TABLE 3.6.6

SUMMARY OF APCD REGULATIONS APPLICABLE TO THE BRIGGS PROJECT

RULE NUMBER AND NAME	SUMMARY	APPLICABILITY TO BRIGGS
207 Instack Monitoring - 100 ton per year Sources	Any source requiring a permit, and which emits 100 tons or more per year of nonmethane hydrocarbons, NO_x, SO_2, reduced sulfur, PM_{10} or CO, shall be equipped with a continuous monitoring device for that pollutant.	Source-specific emission levels of NO_x, PM_{10}, and CO will not exceed the 100 tons per year threshold, so this rule is not applicable to the site.
209-A Standards for Authority to Construct	Defines information, standards, and mitigation measures required for New Source Review. This includes comparing emissions, impacts, and procedures with applicable regulatory programs. The principle regulatory programs include applicable state implementation plan measures, BACT, PSD, NSPS, and NESHAPS.	The Briggs Project requires an Authority to Construct permit and must undergo an New Source Review. The applicability of the various regulatory programs is discussed in Sections 3.6.3 and 4.6.3 The Authority to Construct permit application has been submitted by the Applicant and is currently being reviewed by the APCD.
400 Ringelmann Chart	Emissions opacity from any source is limited to No. 1 (20 percent) on the Ringelmann chart.	Individual sources at the Briggs Project site cannot emit a visible plume that exceeds the standard for more than 3 minutes per hour. This would apply to stationary sources including ore transfer points, stacks from the generators and other sources.
401 Fugitive Dust	Reasonable precautions must be taken to prevent or reduce visible particulate matter from being emitted from non-point sources under normal wind conditions.	The applicant must take reasonable precautions to prevent visible particulate matter from becoming airborne from haul roads, earthmoving activities and other non-point sources. Dust mitigation measures are discussed in Section 4.6.
402 Nuisance	A source may not discharge such quantities of air pollutants which cause injury, detriment, nuisance, or annoyance to a considerable number of persons or which endanger comfort, repose, health or safety of any such persons.	The Briggs Project cannot discharge emissions to the air which cause a nuisance to the public. Emissions would be reviewed for compliance with this rule by New Source Review, and confirmed by monitoring.
404-A Particulate Matter	Prohibits stack emissions with a particulate concentration in excess of 0.3 gr/dscf. Also prohibits hourly discharge of particulate matter in excess of amounts specified on the basis of process rates (40 lbs/hr for the Briggs Project).	No source at the Briggs Project may have stack emissions with a particulate concentration in excess of 0.3 gr/dscf. Also, the particulate emission rate may not exceed 40 lb/hr (based on the process rate of the mine). Emissions of particulate is estimated to be 180 lb/day, so the Briggs Project will comply with this requirement.
416 Sulfur Compounds and Nitrogen Oxides	Concentrations of sulfur compounds may not exceed 0.2 percent by volume at the point of discharge. NO_x emission may not exceed 140 lb/hr from any new or expanded fuel burning equipment used for production of heat or power.	Sources of emissions at the Briggs Project must comply with these requirements. Low sulfur diesel fuel (<0.05 percent) will be used, and maximum controlled NO_x emissions from the generators are estimated to be approximately 16 lb/hr.
419 Gasoline Loading into Stationary Tanks	Tanks used to store gasoline or diesel with a capacity of 250 gallons or more must be filled with a submerged pipe.	The fuel storage tanks for the generators and mobile equipment must be equipped with submerged fill pipes.

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3.7 LAND USE, RECREATION AND WILDERNESS

3.7.1 EXISTING LAND USE PLANS AND POLICIES

1. The Briggs Project must comply with a number of federal, state and county policies and regulations addressing surface mining operations. The BLM is responsible for reviewing and approving the overall mining operations and reclamation plan under 43 CFR 3809 regulations. The County is responsible for approving the reclamation plan in accordance with SMARA regulations. If lands on the project site were to become patented in the future, the County would also exercise general land use authority for overall mining operations under a CUP.

2. The project site is federally owned and is administered by BLM. Mining operations on open federal lands are managed pursuant to the General Mining Law of 1872 and FLPMA. The mining of gold on open federal land is authorized by the General Mining Law of 1872. The BLM has limited authority regarding the rights of access and location of unpatented mining claims on federal lands. The CFRs (that implement FLPMA), however, define specific procedural measures and environmental standards that mining operations must comply with to prevent "unnecessary or undue degradation" of federal lands (43 CFR 3809, Surface Management). In areas where specific statutory authority requires that a stated level of environmental protection or reclamation be attained, that level of protection must be met. Mining operation under federal mining regulations can be denied when it is demonstrated that the operations have not complied with applicable regulations.

3. The County has regulatory authority over unincorporated land not directly regulated by state and federal government agencies or Indian tribes. The County regulates lands through the framework of the General Plan. Land use regulation under the County General Plan would occur if any of the project lands were to become patented in the future.

3.7.1.1 Bureau of Land Management

3.7.1.1.1 California Desert Conservation Area Plan

1. The project site is within the CDCA which encompasses the Mojave, Sonoran and Great Basin deserts located in southeastern California. The CDCA encompasses an area of about 25.5 million acres of which 12.1 million acres are federal lands administered by the BLM under the CDCA Plan. The CDCA Plan was prepared pursuant to a congressional mandate in FLPMA. The main purpose of the CDCA Plan is to protect and enhance the desert environment, while providing for the use of public lands within a multiple-use framework.

This framework attempts to balance the frequently conflicting interests of the various users of the desert. All uses within a planning area must conform to the approved land use, which in this case is the CDCA Plan incorporating multiple land uses.

2. Essentially, all of the public lands in the CDCA under BLM management have been designated under a multiple-use classification system. Four multiple-use classes have been established: C - Controlled (the most restrictive), L - Limited, M - Moderate, and I - Intensive (the least restrictive). The CDCA Plan identifies 19 general land use or resource management activities to be managed within the CDCA, including vegetation, livestock grazing, mineral exploration and development, recreation, and wildlife species and habitat. Specific guidelines for each of these activities are defined for the multiple use classes.

3. The Class C (Controlled) designation applies to areas which have been preliminarily recommended as suitable for wilderness designation. These areas are currently managed under Class L guidelines, or Interim Management Policy (IMP) and Guidelines for Lands Under Wilderness Review, whichever are stricter. Final management decisions for this class will depend upon congressional legislation. (Class C covers approximately 16 percent of BLM lands in the CDCA.)

4. The Class L (Limited Use) designation has been applied to nearly 50 percent of BLM managed land within the CDCA, including the proposed project site, and the majority of the Panamint Valley (south of State Highway 190). This designation generally limits activities to "lower-intensity, carefully controlled multiple use of resources" (BLM, 1980) to protect sensitive, natural, scenic, ecological, and cultural resource values. Mining and mineral exploration uses are permitted in Class L areas, subject to 43 CFR 3802 and 43 CFR 3809 regulations, and applicable state and local law.

5. The Class M (Moderate Use) provides for a wide variety of uses such as mining, livestock grazing, recreation, and energy and utility development. This class covers nearly 30 percent of the CDCA.

6. Class I (Intensive Use) is a class designed for concentrated use of lands and resources to meet human needs. This class covers less than 5 percent of the CDCA.

7. The CDCA Plan also designates Areas of Critical Environmental Concern (ACEC) within the CDCA. Identified ACECs are areas within public lands where special management attention

is needed to protect significant historic, cultural, scenic, wildlife, or other natural resources. There are no ACECs proximate to the project site. The closest ACEC is Surprise Canyon (also known as Panamint City), located approximately 12 miles north of the project site, on the western flank of the Panamint Range.

8. The CDCA Plan also designates areas of UPA and allotments for livestock grazing. No areas within the project site, or proximate to the site have been designated either of these classifications. As described in Section 3.4.2.2.3, however, the arrowwood scrub and alkali seep communities identified within Redlands Canyon do meet the criteria for wetland areas designated by the BLM as UPAs.

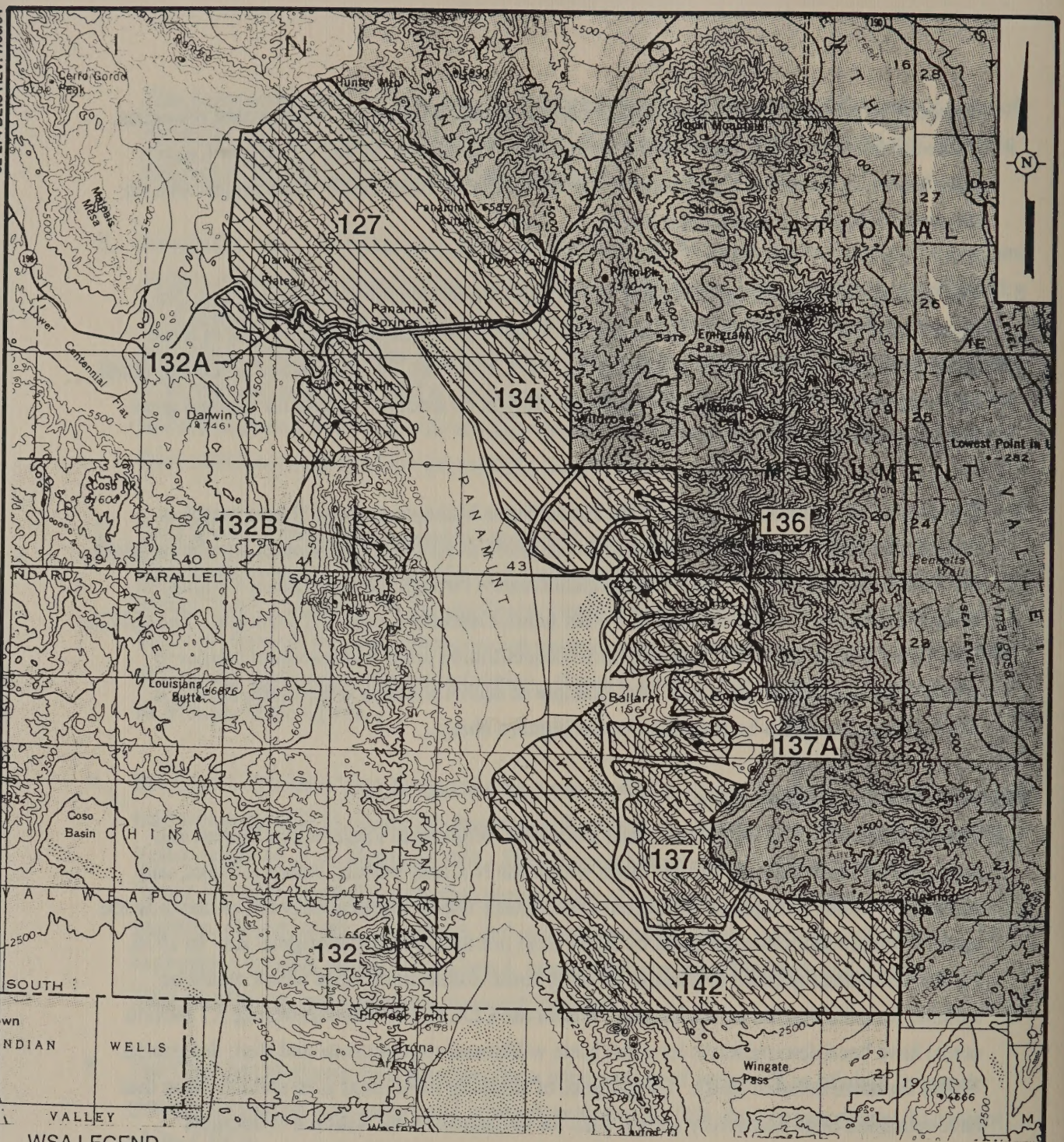
9. The project site is located within a Wild Horse/Burro Management area (burro range) as designated by the CDCA Plan. The BLM is required to achieve and maintain population levels of these herds to maintain a natural ecological balance through the reduction or elimination of conflicts between these animals and other natural resources, especially wildlife. The CDCA Plan focuses upon the wild horse and burro concentration areas and resources subject to competitive uses within the areas. An example of such a resource is Redlands Spring, a water source known to be important to the bighorn sheep.

3.7.1.1.2 Wilderness Study Areas

1. The Wilderness Act of 1964 established a National Wilderness Preservation System and required that inventories of federal lands within the National Forests, National Parks, and National Wildlife Refuges be conducted to determine which would qualify for inclusion in the system. Public lands administered by BLM were not included in the original act. In 1976, FLPMA directed the BLM to identify all of its lands to determine those which would be suitable for preservation as wilderness. Within the CDCA, 137 areas (covering 5.7 million acres) have been determined to have the basic wilderness requirements and were designated WSAs for more detailed study. The purpose of studying these areas is to identify areas that have remained in an essentially natural state for inclusions in the National Wilderness Preservation System, which would preserve these areas for the enjoyment of future generations. Figure 3.7.1 shows the boundaries of WSAs within the Panamint Valley.

2. The BLM's Wilderness Review Program applies to all lands administered by BLM and is divided into three separate phases: inventory, study, and reporting. Subsequent to inventory and study, BLM forwards a recommendation of suitability or nonsuitability for each WSA through the Secretary of the Interior and the President to the Congress. Within two years

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127
132A
134
132B
136
137A
137
142
132
Panamint Dunes
Darwin Falls
Wildrose Canyon
Surprise Canyon
Manly Peak
Middle Park Canyon
Slate Range
Great Falls Basin
Argus Range
Panamint Valley
Darwin Plateau
Darwin
Wildrose
Ballarat
Coso Basin
Indian Wells Valley
Owens Valley
Wingate Pass
Emigrant Pass
Hunter Mtn.
Telescope Peak
Cerro Gordo Peak
Maturango Peak
Louisiana Butte
Florence Peak
Arcana
Argus
Slidell Mountain
Pinyon Pk.
Lowest Point in U.S. -282
Death Valley National Monument
Sea Level
Amargosa
Lower Centennial Flat
Malpais Mesa
Coso Mts.
Pleasant Valley
Bennetts Well
Searles Valley
China Lake Naval Weapons Center
Inyo
Mojave
Death Valley
Inyo National Forest
Standard Parallel South
Mt. Diablo Meridian
Panamint Springs
Pahrump Butte
Lower Pass
Hunter Mtn.
Darwin
Coso Mts.
Maturango Peak
Louisiana Butte
Florence Peak
Arcana
Argus
Wingate Pass
Slidell Mountain
Pinyon Pk.
Emigrant Pass
Wildrose
Ballarat
Coso Basin
Telescope Peak
Cerro Gordo Peak
Malpais Mesa
Lower Centennial Flat
Bennetts Well
Searles Valley
Amargosa
Sea Level
Lowest Point in U.S. -282
Death Valley National Monument
Panamint Springs
Pahrump Butte
Lower Pass
Hunter Mtn.

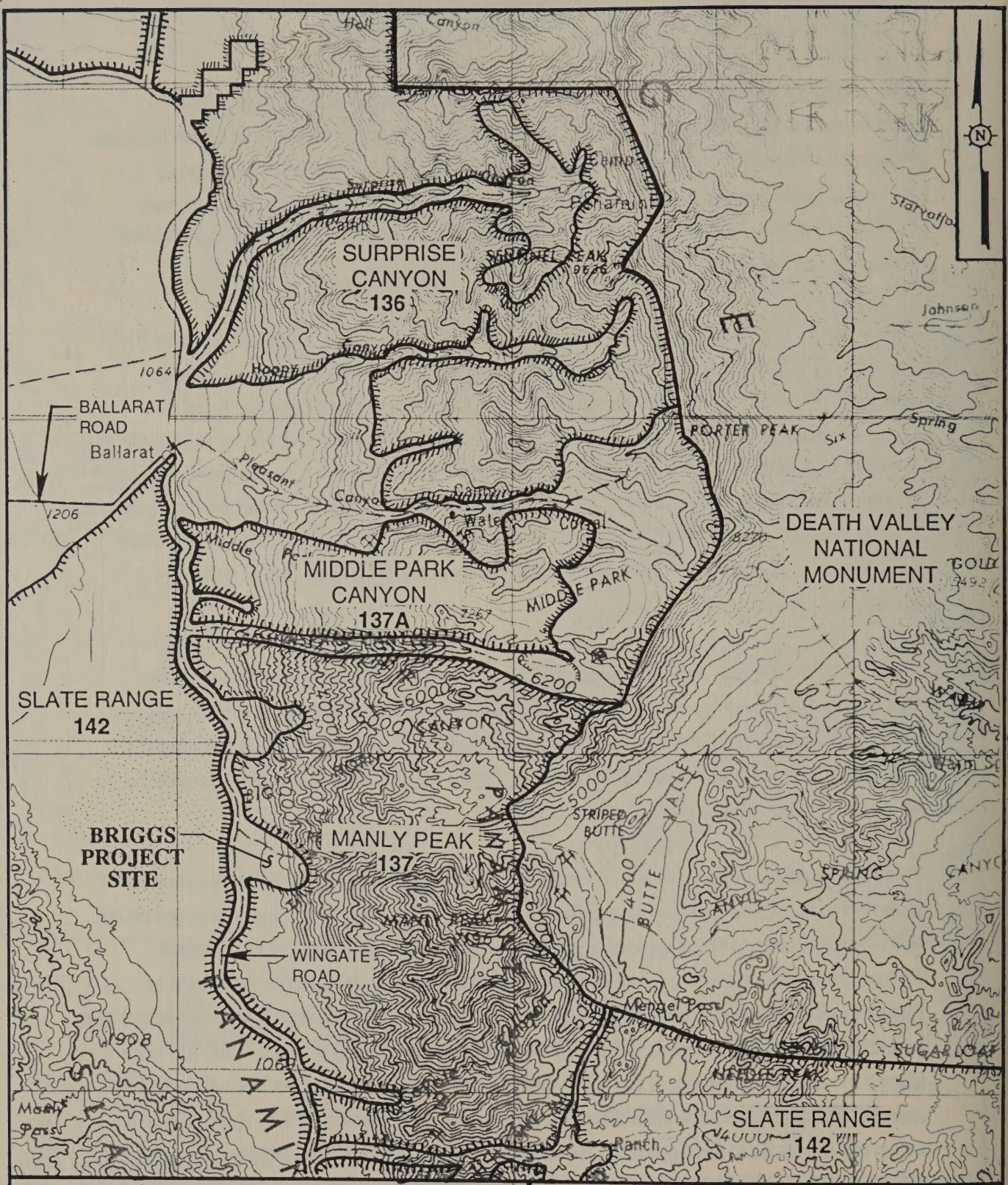
after receipt of each secretarial recommendation, the President must report his final recommendations to Congress. Only Congress may designate an area as part of the National Wilderness Preservation System, and there is no deadline for designation. California wilderness bills are currently being sponsored in the Congress, which would designate wilderness areas. Section ~~3.7.1.3~~ 3.7.2 describes the provisions in these bills, which are referred to as the DPA.

3. No portion of the project site is within a WSA, but it is surrounded by WSAs (see Figure 3.7.2). WSA 137, Manly Peak, comprises a total of 32,026 acres and is generally bounded by Wingate Road on the west, South Park Canyon on the north, Goler Canyon on the south, and DVNM on the east. The project site is one of two small "windows" areas excluded from WSA 137 because of ~~mineral development potential~~ historic mining disturbances. The Manly Peak WSA boundary coincides with the project site boundary (north, east, and south) excluding the site from the WSA. The Middle Park Canyon WSA (137A) is located just north of ~~the~~ South Park Canyon. ~~and~~ The Slate Range WSA (142) bounds the project site to the west.

4. The CDCA Wilderness Inventory was conducted between June 1978 and March 1979. The inventory phase investigations evaluated minimum criteria: natural condition, solitude, primitive or unconfined recreation opportunities, and size. After the initial designation of 137 WSAs, further study based on expanded criteria was conducted by BLM to rank the wilderness potential of the WSAs (BLM, 1990).

5. The 1990 BLM study recommended the entire 32,026-acre Manly Peak WSA be dropped from WSA status and returned to multiple use lands. This recommendation was based on the following rationale: (1) the area possesses marginal wilderness values; (2) wilderness designation of this WSA would not add any additional unique or distinct ecosystems or features to the National Wilderness Preservation System; and (3) the area has moderate to high potential for locatable minerals (BLM, 1990). The natural condition of the WSA has been altered by decades of mining activity but the majority of the WSA has not been disturbed by mining. There are several hundred mining claims located within the WSA. It was described as having moderate to high potential for the occurrence of gold, silver, copper, lead, zinc, and dolomite (BLM, 1990). There are approximately seven miles of routes of travel including primitive ways, washes and other unmaintained routes of access which will remain available for vehicular use.

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REFERENCES:

1. USGS 1:250,000 TOPOGRAPHIC MAPS OF DEATH VALLEY, CALIFORNIA DATED 1970; AND TRONA, CALIFORNIA DATED 1969.
2. WSA BOUNDARIES TAKEN FROM CALIFORNIA STATEWIDE WILDERNESS STUDY REPORT, BLM, 1990.

FIGURE 3.7.2

SITE VICINITY BLM WILDERNESS STUDY AREAS

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6. The BLM recommended that the 9,563 acre Middle Park Canyon WSA (137A) also be dropped from WSA status and returned to multiple use lands. The reasons for this recommendations are similar to those stated for the Manly Peak WSA: mineral potential and lack of manageability.

7. The BLM also recommended that the north and western portion of the Slate Range WSA (56,029 acres of 100,565 acres), including the portion that is proximal to the project site, be dropped from WSA status and returned to multiple use lands. The southeastern portion of the Slate Range WSA (142), beginning about five miles southeast of the project site, was recommended for wilderness designation (44,536 acres of 100,565 acres) by BLM (1990). The project microwave relay station would be located just outside of the westerly boundary of the Slate Range WSA, and is not proximate to the area of this WSA which is recommended for wilderness.

8. Although activities such as mining are not precluded from WSAs, all surface-disturbing activities are reviewed for compliance with nonimpairment criteria established by BLM policy H-5550-1, *Interim Management Policy and Guidelines for Lands Under Wilderness Review* (BLM, 1987) as follows:

   - The use must be temporary.
   - Any temporary impacts caused by the activity must, at a minimum, be capable of being reclaimed to a condition of being substantially unnoticeable in the WSA.
   - At the conclusion of the activity and site reclamation, the area's wilderness values must not have been degraded to the point that significantly constrains the recommendation of the area's suitability or nonsuitability for preservation as wilderness (based on naturalness, outstanding opportunities for solitude or primitive and unconfined recreation, ecological, geological, or other features of scientific, educational, scenic, or historical value).

3.7.1.2 County of Inyo

1. The County General Plan, *1990 General Plan for Development Inyo County, California*, December 1968, has been updated with the adoption of a number of individual General Plan elements. The subsequent elements supersede those applicable portions of the previous General Plan. These elements include: Land Use (1984), Conservation and Open Space (1981), Scenic Highway (1979), Public Safety (1979), and Housing (1992).

2. Inyo County is the second largest county in California, comprising a total of 10,141 square miles. ~~Almost~~ Over 98 percent of the land in the county is owned by public agencies. As such, the majority of the lands, including the project site, are governed by the Open Space and Conservation Elements. Open Space lands have been categorized as four types: (1) Environmental Resource Area; (2) Natural Resource Lands; (3) Arable; and (4) Urban/Rural Community. The project site has been classified as Natural Resource Land. East of the project site, including the mountainous lands and canyons between DVNM and the project site, is designated Environmental Resource Area (Area No. 53, DVNM Environmental Resource Area).

3. The County General Plan reinforces the multiple-use framework as outlined by BLM under the CDCA Plan. The County General Plan recognizes recreation, agriculture and mining as the principal industries in the county and the goals and policies of the Conservation and Open Space Elements are designed to assure the continued existence of these industries. A policy for the Natural Resource Lands is to "Promote the multiple-use of Natural Resource Lands for the maximum social, economic and ecological benefit of the general public." Actions to implement this policy include the enforcement of SMARA (as implemented and enforced under Chapter ~~18.76~~ 7.7 of the Inyo County Code ~~Zoning Ordinance~~).

4. Mining is a permitted land use within the Environmental Resource Area, "The production and conservation of minerals are permitted, provided values related to recreation, watershed, wildlife, range and forage, aesthetic enjoyment, and other environmental factors are adequately protected" (County, 1981).

3.7.2 PROPOSED CALIFORNIA DESERT PROTECTION ACT

1. The DPA has been presented as separate bills in the U.S. Senate (S.21) and House of Representatives (H.R. 518) proposing the protection of public lands in the California desert. Although there are minor differences between the two bills, the major provisions are the same. Final congressional action on the DPA could occur in 1994.

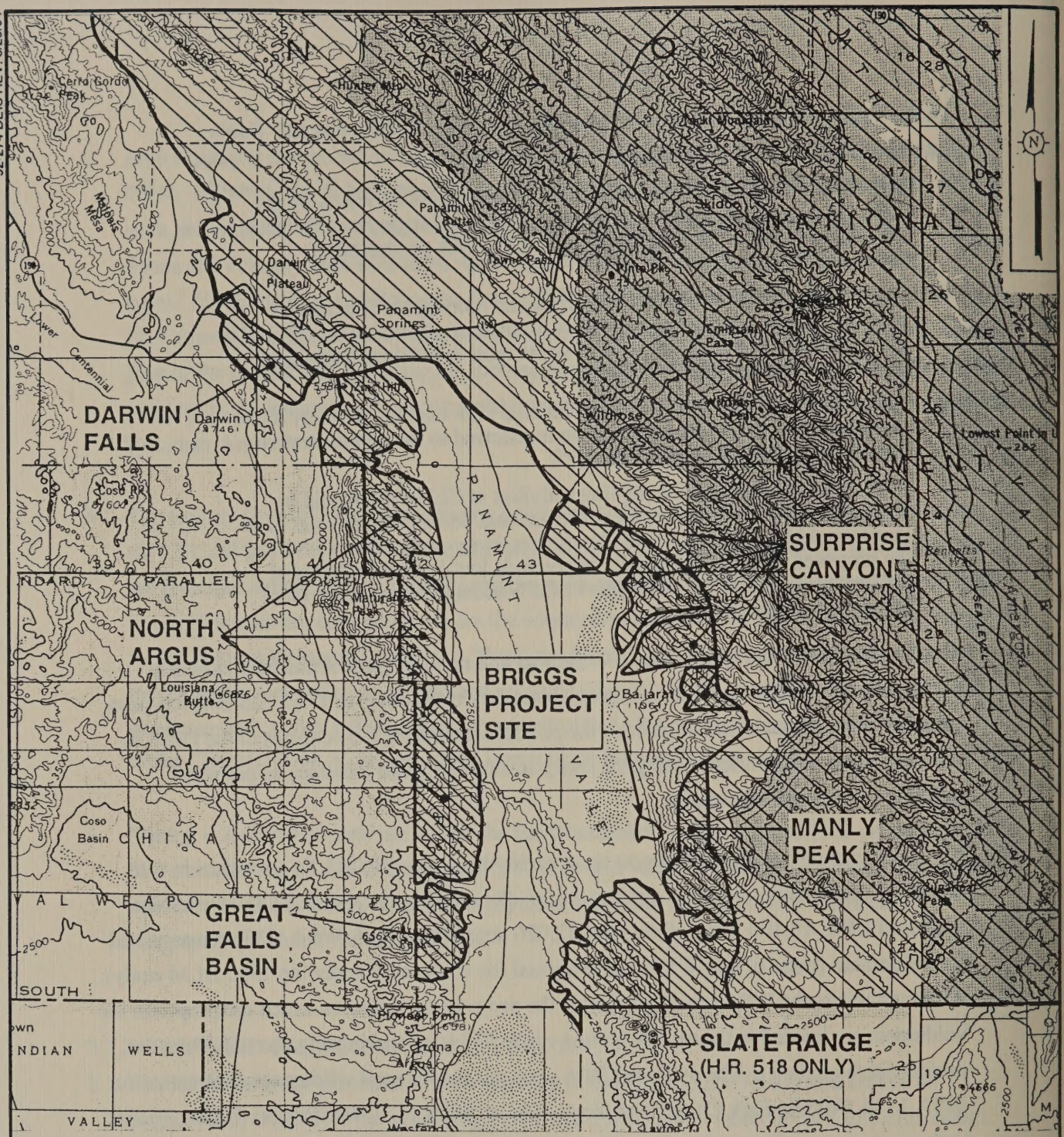
2. The DPA would designate 69 BLM wilderness areas and several WSAs in the California desert, that together would comprise nearly 4 million acres. It would add 1.3 million acres of land to DVNM and redesignate the monument as a national park. The resultant

Death Valley National Park would comprise a total of 3.2 million acres. Further provisions/findings of the proposed DPA are as follows:

- Areas within the CDCA not designated as wilderness or WSAs by the DPA have been adequately studied and would no longer be subject to the requirements of Section 603(c) of the FLPMA pertaining to WSA management.
- Death Valley National Park (as enlarged and redesignated) would be afforded full recognition and statutory protection as a national park; and the wilderness within Death Valley would receive maximum statutory protection pursuant to the Wilderness Act.
- Lands designated for Death Valley National Park that are currently under the jurisdiction of the BLM would be transferred to the administrative jurisdiction of the Director of the NPS.
- Military aircraft testing and training activities at CLNAWS would be recognized as an important part of the national defense system and such lands would be reserved for use by the Secretary of the Navy. Nothing in the proposed DPA would restrict or preclude low-level overflights of military aircraft over the new units of the National Park or Wilderness Preservation System.

Figure 3.7.3 shows the approximate wilderness and national park boundaries currently proposed under the DPA. Due to ongoing boundary revisions, this Draft EIS/EIR has been prepared to assess potential impacts of the project considering the concepts of the DPA, as currently proposed, without basing the analysis on the specific locations of proposed wilderness and park boundaries.

3. The recommendations for wilderness areas under the proposed DPA do not coincide with the BLM recommendations for wilderness (as discussed in Section 3.7.1.1). Under the proposed DPA, 16,105 acres of the total 32,026 acre Manly Peak WSA (137) are proposed for wilderness (none of this WSA was proposed for wilderness under the 1990 BLM study). Although this is the WSA which surrounds the project site, the acres which are proposed for wilderness are located in the middle portion of the WSA (approximately one mile from the project site boundary). The proposed DPA does not recommend wilderness designation for WSA 137A (Middle Park Canyon) or the portion of WSA 142 (Slate Range) that is adjacent to the project site. The southeast portion of WSA 142, beginning about five miles from the project site, is recommended for inclusion as part of Death Valley National Park. The southwest portion of WSA 142, beginning about 2.5 miles from the project site, is recommended for wilderness in H.R.518 as of the date of this printing, but not in S.21.



LEGEND

PROPOSED WILDERNESS

PROPOSED DEATH VALLEY NATIONAL PARK

REFERENCES:

1. USGS MAP OF THE STATE OF CALIFORNIA, SOUTH HALF, 1:500,000. COMPILED IN 1968, REVISED 1981.
2. PROPOSED WILDERNESS AND DEATH VALLEY NATIONAL PARK BOUNDARIES PROVIDED BY BLM.

FIGURE 3.7.3

WILDERNESS AND DEATH VALLEY NATIONAL PARK AREAS CURRENTLY PROPOSED UNDER THE DPA

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4. The current bills include a provision for future review for wilderness suitability for some of the lands not proposed for wilderness. Section 110 of the proposed DPA (S.21, January 1993) states the following:

> "The Secretary is required, ten years after the date of enactment of this Act, to report to Congress on current and planned exploration, development or mining activities on and suitability for future wilderness of the lands as generally depicted on maps entitled *Surprise Canyon Wilderness - Proposed*, and *Death Valley National Park Boundary and Wilderness 15*, dated September 1991 and a map entitled *Manly Peak Wilderness-Proposed*, dated October 1991."

5. The proposed boundary for the expansion (and redesignation) of DVNM has fluctuated under various recommendations to Congress. None of the DVNM proposals currently being considered by Congress, however, would extend the boundary to include the project site. At the time of preparation of this report, the proposed boundary would extend about one mile westerly of the current DVNM boundary in the vicinity of the project site (Figure 3.7.3).

6. If the DPA is passed as currently proposed, at its closest point, Death Valley, a national park, would be located about 2.5 miles east of the project site. The 16,105 acres of WSA 137 which would be designated as wilderness would lie between the project site and the westerly park boundary. At its closest point, the wilderness area would be nearly one mile east of the project site. The balance of the WSA, including areas adjacent to the site, would be dropped from WSA status and returned to multiple use lands. Under the proposed DPA, the Slate Range WSA (142) west of the project site would also be dropped from WSA status and returned to multiple use lands.

3.7.3 REGIONAL LAND USE

3.7.3.1 General

1. As previously stated, over 98 percent of Inyo County is comprised of public lands. The majority of the land is governed by federal agencies including the BLM (2.8 million acres), the CLNAWS (472,000 acres), the Forest Service (776,000 acres), and the NPS (1.79 million acres) (County, 1981). Primary land uses are natural open space, mining, agriculture, and recreation. Approximately 120,400 acres or 1.9 percent of Inyo County is in private ownership.

2. The nearest community to the project site is the small industrial community of Trona, located within the County of San Bernardino, approximately 16 air miles southwest of the site, in the

Searles Valley. The City of Ridgecrest (population approximately 30,000) is located within Kern County, 34 miles southwest of the project site in Indian Wells Valley. Ballarat, a former mining community, is located at the junction of Wingate and Ballarat roads approximately seven miles north of the project site. Ballarat currently consists of a few abandoned adobe structures and a permanent resident.

3.7.3.2 Mining

1. Prospecting and mining characterize the land use activities in the region since the first documented use in 1849. In that year a small party of immigrants lead by William Manly crossed Death Valley and may have exited by way of Redlands Canyon en route to the gold fields. In the 1870s silver was discovered in the Panamint Range and the town of Panamint sprang up. In the 1890s a rush to the southern Panamint Range focused on Pleasant Canyon and lead to founding the towns of Pleasant City, Post Office Spring, and Ballarat.

2. Current mining exploration along the western flank of the southern Panamint Range includes projects in the vicinities of Jackpot Canyon, Pleasant Canyon, and Middle Park Canyon. The activities at these locations are limited to exploration and prospecting. Keystone Mine, located in Goler Canyon south of the proposed project site, has been inactive since 1991.

3. Significant portions of the southern Panamint Range have a moderate to high potential for gold, silver, copper, lead, zinc, and dolomite. Preliminary assessments were prepared by the BLM in 1980 and published in their Geology-Energy-Mineral (G-E-M) Report for the Panamint Range Resource Area (basically bounded by Goler Canyon to the south, South Park Canyon to the north, the DVNM boundary on the east, and Wingate Road on the west). The assessments of mineral potential were based partially on past production. Future production of gold, silver, lead, zinc and dolomite within the surrounding WSA 137 (see Figure 3.7.2), is considered likely (BLM, 1990). Eight known mines and as many as 19 mines or prospects exist in this WSA. As described in Section 3.7.1.1, mining activities are not precluded from WSAs, but are subject to compliance with nonimpairment criteria established by the IMP and Guidelines for Wilderness Review. Return of a large portion of this WSA to multiple use status (15,649 acres of the total 31,754 acres), as currently proposed under the DPA (see Section 3.7.1.3) would remove many of the constraints to mining development within the western portion of this WSA.

3.7.3.3 Recreation

1. The west-facing canyons of the Panamint Range are used for a variety of outdoor recreation activities. A primary recreational use in the area is weekend off-highway vehicle touring in the canyons. Goler Wash, at the southerly terminus of the Panamint Range serves as an alternate off-road vehicle access to DVNM. Other recreational activities in the Panamint Range include the following:
   - Hiking, backpacking and camping in Redlands, Surprise, Happy, Tuber, Jail and other canyons.
   - Mountain biking on numerous routes and trails found in the valley bottom and within the Panamint Range.
   - Equestrian trail rides/endurance events which cross the Slate Range, Panamint Valley, and ascend Goler Canyon to DVNM.
   - Dual sport motorcycle and jeep tours.

2. An existing dirt road leads down Redlands Canyon from Death Valley to within two miles of Redlands Spring. This is the access to the most popular trailhead to Manly Peak, a high point on the southern Panamint Range crest located about three miles southeast of the project site. Manly Peak is on the Sierra Club's list of the 97 most popular desert peaks to climb in the southwest. The majority of people climbing Manly Peak approach it from the north or east along routes that would not be affected by the proposed project.

3. The BLM recreation management provides information for the area through the provision of maps, brochures, and other publications. These materials provide visitors with the information needed for self-guided recreational activities and maintain the predominant casual use orientation of recreational activities. Local attractions in the Panamint Range include the former mining towns of Panamint City and Ballarat. A major recreational attraction, as discussed in the following section, is the DVNM.

3.7.3.4 Death Valley National Monument

1. The western boundary of the DVNM in the vicinity of the project site follows the ridgeline of the Panamint Range and is located approximately four miles east of the project site (see Figure 3.7.1). The DVNM covers 1.96 million acres. Established in 1933 by presidential proclamation, the purpose of the monument is the preservation of "the unusual features of scenic, scientific, and educational interest..." The monument includes most of the 156-mile long north/south trending trough formed between major block faulted mountain ranges: the Grapevine, Funeral and Black mountains of the Amargosa Range to the east, and the Cottonwood and Panamint ranges to the west.

2. The ecosystems in the DVNM are diverse. Of prime significance are the varied plants and animals that inhabit the area; desert bighorn sheep, mule deer, kit fox, coyote, and five species of pupfish. Abundant prehistoric/historic remains, the history of the '49ers, a residential native American tribe, early exploration, gold, silver, talc, borax mining, and Scotty's Castle, are key areas of cultural and historical significance. Since 1973, the tourist visitation to the park has fluctuated between 600,000 per year (NPS, 1990) and 1,000,000 per year (the highest visitation occurred in 1993).

3. Numerous (3,000 to 4,000) mining claims, both abandoned and operating, are located within DVNM. The Mining in the Parks Act (September, 1976, Public Law 94-429) authorized new regulations to protect natural features of NPS areas as valid mineral rights are exercised. The Mining in the Parks Act closed natural areas of the National Park System to further mining entry or location of mining claims and required a confirmation of all unpatented mining claims by recording with the superintendent. Since the Mining in the Parks Act, mining claims have been reduced; as of August 1983, there were 108 valid unpatented claims and 188 patented claims. Federal regulations (36 CFR 9), as enforced by monument staff, provide control over mining operations.

4. As described in Section 3.7.2, the currently proposed DPA includes provisions to enlarge DVNM and also elevate its status to a national park.

3.7.3.5 Military

1. Founded in 1943, the CLNAWS (formerly the Naval Weapons Center) comprises approximately 1,100,000 acres in Inyo, Kern, and San Bernardino counties. It was developed for test and evaluation of rockets and as a proving ground for aviation ordnance. The station's accomplishments over the years have included rocket development during World War II, the Sidewinder air-to-air missile, and the development of over 75 percent of the air-to-air and air-to-ground weapons being used in combat by 1965. CLNAWS gave weapon-system support, and provided intense laboratory efforts and test-range activity during Operation Desert Shield/Desert Storm.

2. The vast, sparsely populated desert, with near perfect flying weather year-round and practically unlimited visibility proves an ideal location for the facility. CLNAWS includes ~~17,000 square miles of~~ over one million acres of land (with associated restricted air space from the surface to infinity), ~~with~~ a physical plant of nearly 2,000 buildings, over 2.5 million

square feet of laboratory space, and approximately 700 housing units ~~(CLNAWS, 1992)~~. Additionally, CLNAWS shares management responsibilities for 17,000 square miles of airspace within the R-2508 Special Use Airspace Complex.

3. The R-2508 Complex is made up of restricted airspace, Military Operations Areas and Air Traffic Control Assigned Airspace areas, which combined create special use airspace for military use from near the surface (as low as 200 feet above the ground) to unlimited altitudes. The R-2508 Complex Control Board serves as a tri-service management organization representing the Commanders from three military installations: CLNAWS; Air Force Flight Test Center, Edwards Air Force Base; and National Training Center, Fort Irwin. The Complex Control Board through its administrative office, the R-2508 Central Coordinating Facility, maintains cognizance over all military activity conducted in the R-2508 Complex.

~~3.~~ 4. Panamint Valley lies below the Panamint Military Operations Area and is used by Department of Defense aircraft for training and testing to support the military mission. The ~~is included within a designated~~ Military Operations Area ~~that~~ includes high speed flights (in excess of 250 knots) and low level flights (within 200 feet of ground level). Aircraft must, however, maintain a minimum of 500 feet above any structure or person. Flights over the valley include aerial combat maneuvering and weapons test and evaluation flights. Although ~~not within an officially~~ Panamint Valley is not currently designated as supersonic corridor, ~~CLNAWS is authorized to conduct supersonic flights over the area~~ sonic booms may be heard from flight operations in nearby restricted airspace.

3.7.4 PROJECT SITE LAND USE

1. The isolation and physical characteristics of the project site ~~results~~ result in limited land uses. Land use at the project site is primarily existing and former mining exploration. The project site is not utilized for grazing due to the lack of suitable forage and watering sources. Recreational uses ~~at the project site~~ are similar to the rest of the west Panamint Range and include hiking, mountain biking, and off-road vehicle touring. The County-maintained Ballarat and Wingate roads allow two-wheel drive access ~~in~~ to the project site vicinity along the east side of Panamint Valley. ~~Vehicle~~ Automobile access ~~beyond~~ above the mouth of Redlands Canyon is limited to four-wheel drive vehicles. ~~due to the steepness of the mountains in this vicinity. From Redlands Canyon, the mountains are too steep in areas for even four-wheel drive vehicles or to allow access through the canyon over the ridgeline to~~

~~DVNM.~~ Four-wheel drive access terminates about 1,000 feet east of Manly Fall, where the terrain becomes too steep and rugged for vehicular use.

2. Considerable evidence of past and present mining activities exists at the project site. Numerous mine adits exist in the vicinity of the proposed mine pit. Canyon acquired the interest in 1990. Since its acquisition, the company has actively engaged in a program of exploratory drilling and metallurgical testing. Exploration road cuts, mining excavations and adits exist from both Canyon's exploration and from previous exploration and mining by others. A small abandoned mill from previous mining, located on the alluvial fan portion of the property, is being dismantled and removed.

3.8 VISUAL RESOURCES

1. This section reviews the visual quality and character of the project site and surrounding region. Photographs showing existing views of the area and the location of the photographic viewpoints are provided in Figures 3.8.1 and 3.8.2.

3.8.1 VISUAL MANAGEMENT

3.8.1.1 Bureau of Land Management Plans and Policies

1. BLM's guidelines for management of the area's visual resources reflect requirements of both NEPA and FLPMA. NEPA states that it is the responsibility of the federal government to "...assure for all Americans safe, healthy, productive, and aesthetically pleasing surroundings." FLPMA requires that "...public lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air, atmospheric, water resource, and archaeological values..." (FLPMA, Section 102[a][8]). BLM's guidelines for implementing NEPA and FLPMA aesthetics goals are addressed in the BLM *Visual Resource Management Program* (BLM, 1981).

2. Visual resources are those properties that make up the scenic quality of the landscape including the land surface, water, vegetation, and other natural or man-made features. The BLM is concerned with managing visual resources and attaining acceptable levels of visual impact without unduly reducing commodity production or limiting overall land management program effectiveness (BLM, 1981). It is therefore BLM policy that visual resource considerations be included in NEPA environmental evaluations, in land use planning decisions, and in the implementation of projects.

3. BLM's evaluation process for visual resources consists of: (1) evaluating existing aesthetic characteristics; (2) considering the level of allowable contrast for proposed projects; and (3) assessing as part of project reviews, the level of contrast that would occur. The allowable level of contrast is based on inherent visual quality in the vicinity, area visibility and viewer sensitivity. Visual simulations, such as those discussed in Chapter 4.0, are utilized to evaluate contrast that would occur.

3.8.1.2 County Plans and Policies

1. The County's General Plan is comprised of separate planning elements which have been updated and integrated into the General Plan in different years. Visual-related policies are

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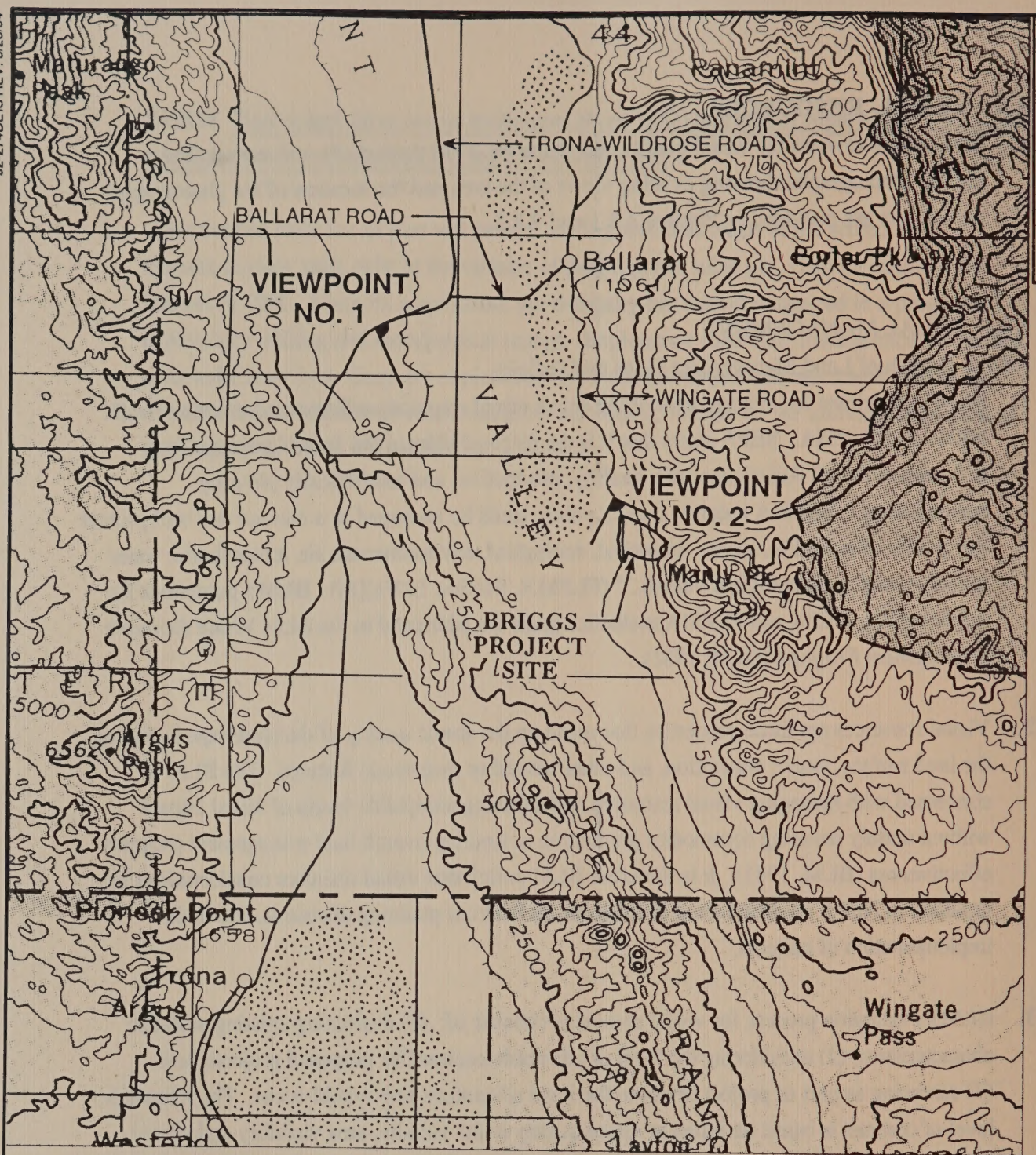


FIGURE 3.8.1

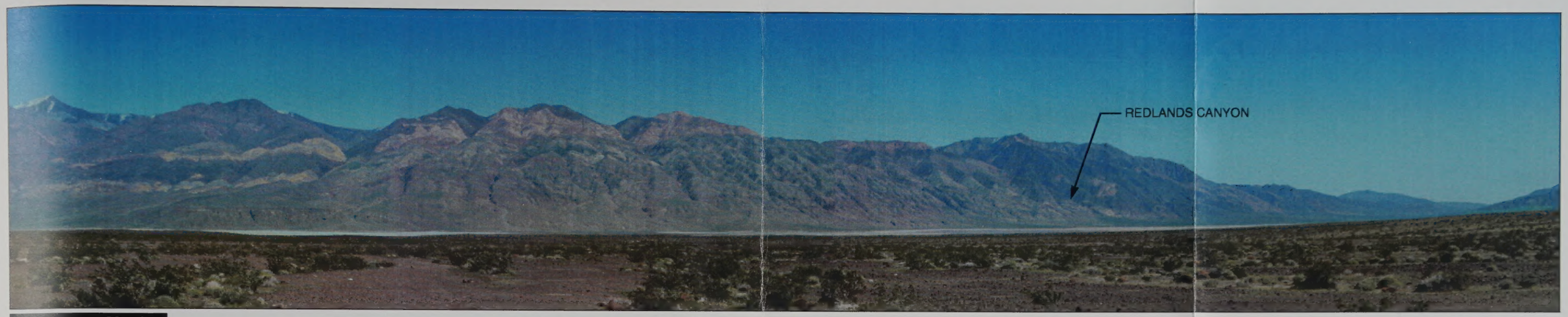
VIEWPOINT LOCATIONS

BRIGGS PROJECT

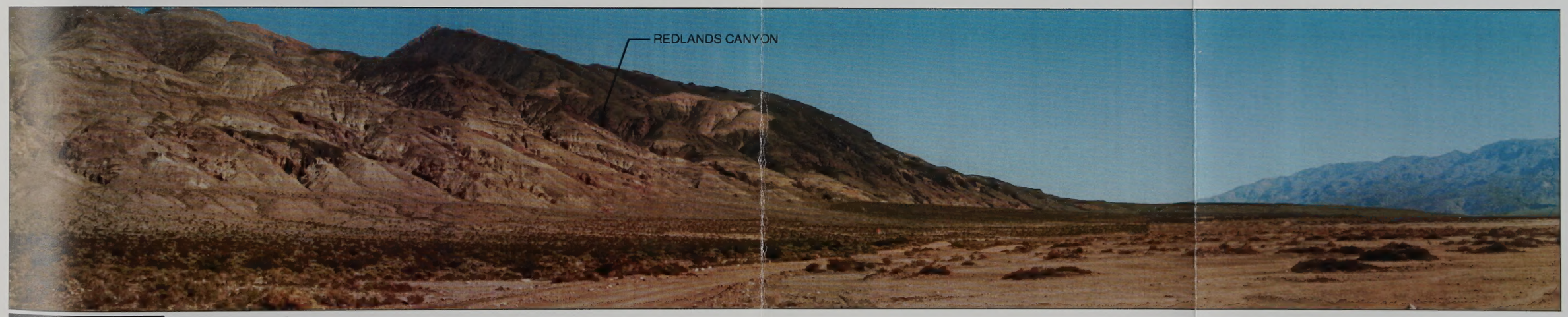
ENVIRONMENTAL SOLUTIONS, INC.

REFERENCE:
USGS MAP OF THE STATE OF CALIFORNIA, SOUTH HALF, 1:500,000, COMPILED IN 1968, REVISED 1981.

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VIEWPOINT NO. 1



VIEWPOINT NO. 2

VIEWPOINT NO. 1: View southeast from Trona-Wildrose Road. The Panamint Range dominates the landscape. The deeply incised Redlands Canyon and the site location at the canyon mouth are visible in the right-middle ground of the photograph.

VIEWPOINT NO. 2: Proximal view of the site area from Wingate Road. The dominant visual form is the Panamint Range slopes. Striking natural color variations are evident on the sparsely vegetated and incised steep rock slopes. Existing exploration road cuts on the face of the slopes near Redlands Canyon (center) are visible, but result in a low level of contrast because of the natural lack of vegetation and rock color variations.

FIGURE 3.8.2

EXISTING VIEWS OF THE SITE AREA

BRIGGS PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

outlined in the Scenic Highway Element (1979) and the Open Space and Conservation Elements (1981). State Highway 190 in northern Panamint Valley is a state scenic highway. No state highways are located in southern Panamint Valley, so ~~N~~none of the roads in southern Panamint Valley is designated as scenic.

2. The County's Open Space and Conservation Elements (June, 1981) call for conservation, development and utilization of natural resources and the preservation and conservation of open space lands. The elements are designed to ensure the continued existence of the County's principal industries of recreation, agriculture, and mining through the wise use of open space lands. Among the County's goals which pertain to all land uses, the following are related to visual resources:

   - Protect, conserve, develop and utilize natural resources, while at the same time protecting the environment.
   - Increase accessibility and enhance the use and enjoyment of the County's scenic, natural, historical and cultural resources.

   The following policy is specifically applicable to the proposed mining use:

   - The production and conservation of minerals are permitted, provided values related to recreation, watershed, wildlife, range and forage, aesthetic enjoyment, and other environmental factors are adequately protected.

3.8.1.3 Death Valley National Monument Policies

1. Although the project site is not located within the boundaries of DVNM, some of the park's goals and policies address potential impacts from surrounding land uses. Among the NPS's goals for visual resource, the following policy relates to the proposed Briggs Project:

   - Prevent, eliminate, or reduce artificial lighting, noise, or raising dust in order to preserve the opportunity for visitors to experience the night sky and stillness of the desert.

3.8.2 REGIONAL CHARACTERISTICS

1. Visual resources are those properties that make up the scenic quality of the landscape. These properties can be described in terms of the visual elements of form, line, color and texture. In general, the stronger and more diverse the influences exerted by these elements are, the more interesting and more aesthetically pleasing the landscape is. This section describes the existing visual character of the landscape in the project region, based on these elements and

other factors considered in BLM's visual resource inventory guidelines. Typical area views are similar to the existing distal view of the project area shown in Figure 3.8.2.

2. The project site is located at the base of the western slopes of the Panamint Range in the southern portion of Panamint Valley. The westerly slopes of the Panamint Range are very steep, and deeply incised and range in height from about 5,000 to 10,000 feet from the valley floor to the ridge tops. The high vertical relief and relatively uniform steep slopes set against the flat valley floor result in the mountain slope and ridge line being the dominant visual form of views toward the project area.

3. "Line" is defined as the path that the eye follows when perceiving abrupt difference in form, color or texture. For views in the southern Panamint Valley area, there are two dominant visual lines that share primary importance depending upon the point of view. For viewpoints from the valley floor, the flat and light-colored playa surface contrasting with the adjacent mountain forms provides a distinct and dominating horizontal line leading the eye along the mountain slopes. For views from higher elevations this line is subordinate to the distinctly linear trend of the fault-line scarp represented by the foot of the Panamint Range slope. In either case, however, the result is similar generally leading the eye along the mountain front.

4. Texture (defined as the visual manifestation of the interplay of light and shadows) of area views is relatively subtle because of the uniformity of the slopes and the sparse and nonvariable vegetation. The texture that is present is dominantly due to the drainages incised into the mountain slopes and foreground vegetation. Color plays a more dominant role than texture primarily due to differences in rock units exposed on the mountain slopes and the light playa surface, providing some contrast for views of the upland areas. Dominant colors are varying shades of browns, tans and grays. Within the valley floor, color contrast is minimal except for the light-colored playa surface juxtaposing the browns of the older soils and greens and browns of the limited vegetation.

5. Surface water is not generally present. When standing water does occur in the playa, it does not appear notably different than the uniform light playa soils.

6. As adjacent scenery is largely uniform and similar, there are no particular visual complements to influence the overall visual quality. However, the landscape is likely to be considered interesting to individuals with an affinity for nature and open spaces, geologic outcrops, etc. Similar settings dominate the region so it would not be considered scarce or unique.

7. Limited manmade disturbances pervade the region. There are a number of mining and prospecting sites along the slopes of the Panamint Range and Slate Range. Unimproved dirt roads access some of these sites and other regional features (e.g., communication towers on peak tops). Also, there is an FAA radar station adjacent to Ballarat Road and an associated overhead power line to this station coming from the south. ~~The historical site of~~ Ballarat includes several structures and remnants of earth and rock structures from circa 1900 mining activities in the area.

8. As discussed in Section 3.8.1.2, there are no scenic highways that pass through the valley. Available traffic counts indicate that approximately 215 vehicles per day pass through the vicinity on Trona-Wildrose Road. While this reflects low use of the area, this traffic count represents approximately 196,000 individual opportunities to view the site per year based on an average of 2.5 persons per vehicle (BLM's standard load factor for this area).

9. The area has not been formally classified by BLM for visual resource management. However, the area has been inventoried. BLM's management goals for the area were used to develop the significance criteria in Section 4.8.

3.8.3 LOCAL VISUAL CHARACTERISTICS

3.8.3.1 Site Visibility

1. Views of the proposed project site are confined to locations within Panamint Valley and the ridge line along the west side of the valley. It is not visible from any location within DVNM which, at its closest point, is located nearly four miles east of the project site on the opposite side of the Panamint Range ridge line.

2. The only paved through-road in the southern Panamint Valley area is Trona-Wildrose Road, which passes through the valley about eight miles northwest of the project site at its closest location. Views of the project site from this road are limited to various degrees due to distance, viewing angle, and intervening topography. For travelers northbound, the site area comes into view in the distance primarily for an approximately two-mile stretch (about two minutes) where the road turns northeast and east in the center of the valley. There are also limited views of the site, primarily the highest elevation portions, from parts of the Slate Range crossing. For southbound travelers, the site vicinity comes into view primarily for an approximately ten-mile stretch (about 10 minutes). Where the road trends south-southwest towards the project.

However, the view of the site is limited due to distance (about 8 to 18 miles). Even more distant views are available further north.

3. Dirt roads that afford views of the site area are used much less frequently and primarily include:
   - Ballarat Road - The site vicinity comes into view for a distance of about three miles. View of the site is limited due to distance and viewing angle.
   - Wingate Road - This road offers a proximal view of the site for about four miles where it traverses the site area.

4. The proposed offsite microwave station is located along the ridgeline of the Slate Range (Figure 3.2.1). The station would be located on a subordinate peak of the Slate Range north of Manly Pass. This peak is visible from portions of the Searles Valley and portions of southern Panamint Valley, as well as adjacent mountains to the east and west. An existing communications station is located adjacent to the proposed microwave station site (Figure 2.13).

3.8.3.2 Scenic Quality

1. Figure 3.8.1 shows the location of two key visual observation points selected to represent views of the site area. Viewpoint No. 1 is located at the approximate closest location of Trona-Wildrose Road and represents the most proximal viewing location on a paved road. Viewpoint No. 2 is located on Wingate Road adjacent to the project site where a proximal view of site disturbances will be possible. Existing views for these viewpoints are provided in Figure 3.8.2.

2. The project site is located at the base of the Panamint Range at the mouth of the westerly draining Redlands Canyon. Distal views are dominated by the form of the Panamint Range and the distinctly contrasting browns, tans and grays of the upland slopes. The foot of the mountains where they intersect the valley alluvium form a striking lineation. Low subordinate lineations occur as a result of fault-displaced terraces near the valley floor. Redlands Canyon forms a dominant incision that dissects the otherwise relatively uniform slope of the mountain flank. Other drainages near the project site are only slightly incised resulting in a low interplay of texture. Vegetation is sparse and does not notably contribute to the visual characteristics of the upland or alluvial fan areas.

3. For proximal views, the texture afforded by the slightly incised drainages and lines of the low faulted terraces become more distinct but remain subordinate to the mountain form and rock color variation. Vegetation provides some texture to the foreground. As for distal views, vegetation does not notably contribute to visual characteristics of the mountain slopes due to its sparsity. Cultural modifications that are visible include Wingate Road, surface disturbances related to historic and ongoing prospecting and exploration, and, at two isolated locations within the project boundary, equipment and structures left over from mining activities of recent decades.

4. Former mine workings (e.g., adits) and tailings at the project site are visible but are not conspicuous visual features.

3.8.3.3 Light and Glare

1. The Panamint Valley is remotely located from urban activities and major highways. Light sources are essentially limited to occasional vehicles and minor stationary lighting, for example, at the residence in Ballarat and as may occasionally be used for ongoing exploratory activities. There are no known substantial sources of light in the area.

3.9 CULTURAL RESOURCES

1. Cultural resources are places or objects that are important for scientific, historic, and/or religious reasons to cultures, communities, groups, or individuals. Cultural resources include historic and prehistoric archaeological sites, architectural remains, engineering structures, and artifacts that provide evidence of past human activity. They also include places or items of importance in the traditions of societies or religions. Scoping for this Draft EIS/EIR and BLM consultation with local Native American tribes has not revealed any Native American concerns in the project area.

2. The following sections present a brief summary of the cultural history of the Briggs Project area, and an inventory and significance evaluation of the cultural resources recorded within the project site and at the locations of the offsite microwave station, ~~and~~ offsite borrow areas, and associated access routes. These sections are primarily based on the following reports prepared by Western Cultural Resource Management, Inc.:

   - *A Class III Cultural Resource Inventory of the Briggs Project, Inyo County, California* (Rusco et al., 1993).
   - *A Class III Cultural Resource Inventory of the Historic Roads, Trails and Routes of the Briggs Project, Inyo County, California* (Mehls and Lennon, 1993).
   - *Results of a Class III Inventory of Proposed Repeater Facility Site* (Lennon, 1993a).
   - *Results of Survey of Potential Clay Sources* (Lennon, 1993b).
   - *A Class III Cultural Resource Inventory of the Briggs Project Expansion, Inyo County, California* (Stoner and Mehls, 1994).

   Cultural resources were recorded within the proposed Briggs Project site, but the offsite microwave station, related access route, and the two potential clay sources and access routes were negative for cultural values.

3.9.1 REGIONAL SETTING

3.9.1.1 Prehistory

1. The prehistory of the Briggs Project region is poorly known, but the earliest evidence of human occupation is a large fluted point found in the northern Panamint Valley and datable to late Pleistocene/early Holocene times. The climate at the time was cooler and moister than at present, with abundant surface water occurring at lakes, rivers, and springs.

2. During the subsequent Archaic period, native peoples responded to the drying ~~out~~ and warming ~~up of the~~ environment, which reduced ~~the~~ productivity of the environment and required changes in subsistence practices. Food and water resources became less abundant and more dispersed. Native peoples became more nomadic and developed technologies~~,~~ such as the metate, mano, mortar and pestle, that facilitated exploitation of foodstuffs not previously included in the diet. The Archaic period persisted for approximately seven millennia in the project region, and an archaic lifestyle continued to be practiced during ethnohistoric times. Distinct artifact types including projectile points, ground stone, and pottery are associated with various chronological divisions of the Archaic.

3.9.1.2 Ethnohistory

1. At the time of Euroamerican contact with Native American peoples, the Panamint Valley was occupied by the Kawaiisu to the south and the Panamint Shoshone to the north (Steward, 1938). Similar to other desert adaptations, the Kawaiisu and Panamint Shoshone were highly mobile groups of hunters-and-gatherers whose livelihood depended on harvesting economically important plants and animals in dispersed locations as they became seasonally available. Low elevations, the lack of potable surface water, and hot summer temperatures in the project region created conditions unfavorable to human subsistence, and these conditions resulted in low population densities in the project area.

2. Springs were the primary locations of semipermanent or temporary residence in the project vicinity. A winter village at Warm Springs, north of the project area, is known from ~~for~~ ethnohistoric times, and Wildrose Springs in the Panamint Range is reported to have also supported a few winter residents (Steward, 1938). Native peoples hunted mountain sheep and gathered seeds and pine nuts in the Panamint Range. Mesquite, where available, was an economically important foodstuff.

3.9.1.3 History

1. Prospecting and mining characterize the land use activities in the project vicinity during the historic period. However, the first documented use of the project area and vicinity was during the winter of 1849-1850 when a small party of immigrants known as the Bennett-Arcan Party exited Death Valley by way of Redlands Canyon. The party, led by William Manly, endured many hardships in crossing Death Valley en route to the western gold fields. Manly's colorful reputation as an adventurer was enhanced by the documented exploits of this expedition.

2. In the 1870s, silver was discovered in the Panamint Range, with a mining district formed for the Surprise Canyon claims. A rush ensued, and the town of Panamint sprang up. Typical of the boom and bust cycle of historic mining, the town and most of the mines were abandoned by 1877. Prospecting for gold and silver, however, continued on a much reduced scale.

3. In the 1890s, a rush to the southern Panamint Range focused on Pleasant Canyon and lead to the founding of the towns of Pleasant City, Post Office Spring, and Ballarat. Just as Ballarat reached its peak in 1900, gold was discovered in the Tonopah and Bullfrog districts of Nevada, resulting in a major exodus from the southern Panamint locale.

4. In the late 1920s and 1930s, mines in the Ballarat-Panamint area experienced more work as a response to the Great Depression. By the late 1930s, most mining in the area could be characterized as subsistence mining. Six mines were operating during World War II, many providing base metals such as lead and antimony. By the early 1950s, only two mines were reportedly in operation (Rusco et al., 1993).

3.9.2 LOCAL SETTING

3.9.2.1 Cultural Resource Inventory

1. ~~A cultural~~ Cultural resource ~~inventory~~ inventories of the Briggs Project area and adjacent offsite area, the offsite microwave station and related access route, and borrow areas and related access route were ~~was~~ developed through archival and informant research and intensive field investigations (Rusco et al., 1993; Mehls and Lennon, 1993; Lennon, 1993a; 1993b; Stoner and Mehls, 1994). Archival records searches were conducted at the Eastern Archaeological Information Center (University of California, Riverside) and the BLM Ridgecrest Resource Area Office. These searches revealed that previous survey and testing investigations of a limited nature had been conducted within the Briggs Project area and vicinity (Moore, 1981; 1982; von Werlhof, 1983; Kliman, 1983; Younkin, 1984; Oxendine, 1987; 1989). Intensive pedestrian surveys of the Briggs Project site and offsite areas were conducted for the Proposed Action, with transect spacing at 30-meter intervals, which meets BLM requirements. A subsequent study of the project area focused on historic trails. Archival and oral informant research, intensive field survey, photographic documentation, and evaluation were completed for the onsite historic trail resources (Mehls and Lennon, 1993).

2. The survey and inventory investigations resulted in the recording of the following cultural resources in the Briggs Project area (Table 3.9.1):

   - Two prehistoric rock alignments associated with trail segments.
   - ~~Five~~ Six ~~twentieth century~~ mining-related sites (e.g., trash scatters, foundations, structural remains, ~~building vestiges and other features,~~ change house, powder magazine, Briggs Cabin, aerial tram tower and terminal, ore chute and rail system, mills, and ~~others~~ other features generally dating from the late 1800s to the 1930s and later).
   - Three historic trail complexes or roads.
   - ~~One~~ Five isolated historic hearths.
   - ~~Five~~ Nineteen historic isolates.

   In addition to these resources, the project area and vicinity displays abundant evidence of mining and prospecting activities during late historic and contemporary (less than 50 years old) times. These resources include two mining shafts, four adits, and six prospect pits.

3. Separate surveys for cultural resources were performed by Western Cultural Resource Management, Inc., at the site of the proposed microwave repeater station and related access route (Lennon, 1993a) and at the two potential clay borrow sites on the playa and the associated access route to the potential south borrow area (Lennon, 1993b). No cultural resources, historic or prehistoric, were found in these survey areas. A records search conducted at the BLM Ridgecrest Office indicated that no previously recorded sites were known for ~~the~~ these offsite project areas.

4. Sites CA-INY-4643 and CA-INY-4644 are prehistoric period sites, the first of which contains a series of linear and curvilinear rock alignments with some packed circle design elements, and the latter of which contains a single continuous linear/curvilinear alignment. Both sites are crossed by firmly-packed, cleared trails. The rock configurations are situated on desert pavement surfaces, and constructed of patinated cobbles that are partially embedded. Similar rock feature sites in association with trails have been recorded for northern Panamint Valley, but these two are the first recorded in the southern portion of the valley.

5. The remainder of the recorded cultural resources within the project area are historic period properties related either to mining and prospecting or to travel. Site CA-INY-4581-H consists of the Briggs Cabin, a two-room, gable-roofed wood structure that is in current use as a storage building. It was built sometime in the 1940s by Harry Briggs of Trona, California.

TABLE 3.9.1

CULTURAL RESOURCE INVENTORY AND SIGNIFICANCE EVALUATION

SITE/ISOLATE NUMBER(1)(2)	SITE TYPE~~(2)~~(3)	SITE AREA (m^2)	NATIONAL REGISTER ELIGIBILITY RECOMMENDATION~~(3)~~(4)	REMARKS
CA-INY-4581-H	H - Woodframed, two-room cabin	45	Not eligible	Briggs Cabin. Chronology: ca. 1940s to present.
CA-INY-4582-H	H - Trash scatter	150	Not eligible	Surface scatter of tin cans, a food pail, and a wash basin. Chronology: ca. late 1800s to 1930s.
CA-INY-4583-H	H - Tin can scatter	10	Not eligible	Food containers. Chronology: ca. late 1800s.
CA-INY-4584-H	H - Trash scatter in two concentrations		Not eligible	Surface scatter of historic debris including cans, glass, ceramics, nails, stove and furniture parts, and other items. Chronology: ca. late 1800s to 1920s and 1940s to 1960s.
CA-INY-4585-H	H - Mine site complex	4,280	Not eligible	Briggs Camp Mine with seven features including cement foundations, assay area, mine adit, retaining wall, change house, powder room, and others. Chronology: ca. 1940s to 1950s.
CA-INY-4643	P - Rock alignment/ features associated with trail segments	80	Eligible	Minimally, five associated rock feature elements. No artifacts occur in association.
CA-INY-4644	P - Rock alignment associated with trail segments	100	Eligible	One continuous element. No artifacts occur in association.
CA-INY-4684-H	H - Manly-Bennett-Arcan Route segments (3)	86	Non-contributing elements of an eligible property	Manly-Bennett-Arcan route through Redlands Canyon into Panamint Valley. Chronology: 1849-1850. The segments lack integrity of design, association, and feeling.

(1) Four adits, two mine shafts, and six prospects were also observed. ~~during the field survey~~.

(2) Site CA-INY-4814-H and isolates HIA-1a through HIA-18a were recorded in the adjacent offsite survey area (Stoner and Mehls, 1994).

~~(2)~~ (3) H = Historic; P = Prehistoric.

~~(3)~~ (4) Formal National Register eligibility determinations are made by the federal agency (BLM) in consultation with the SHPO, as regulated by 36 CFR Part 800 to fulfill the requirements of NHPA. The recommendations in this column are presented in the technical reports (Rusco et al., 1993; Mehls and Lennon, 1993; Stoner and Mehls, 1994), and will be provided to SHPO by BLM. Compliance with Section 106 of NHPA is the responsibility of BLM, as the lead agency for cultural resources. SHPO consultation will be completed prior to the Record of Decision for the Proposed Action.

TABLE 3.9.1

CULTURAL RESOURCE INVENTORY AND SIGNIFICANCE EVALUATION
(Continued)

SITE/ISOLATE NUMBER(1)(2)	SITE TYPE~~(2)~~(3)	SITE AREA (m^2)	NATIONAL REGISTER ELIGIBILITY RECOMMENDATION~~(3)~~(4)	REMARKS
CA-INY-4685-H	H - Wagon road or two-track road segment	133	Not eligible	Probably once connected Briggs Camp with Wingate Road.
CA-INY-4686-H	H - Miners' trails and paths	1,200	Not eligible	Trail complex connecting Briggs Camp, prospects, mines, and other workings.
CA-INY-4814-H	H - Mine and mill site complex	84,500	Eligible	Gold Tooth Mine and mill site, with 43 features, including adits, stopes, ore chute and rail system, aerial tram tower and terminal, tailings impoundment area, tanks, platforms, rock retaining wall, stairway, trails, roads, structural remains, can dumps, and others.
HF-1	H - Isolated hearth feature	3	Not eligible	Hearth with burned/melted wire nails, glass, staples, bone, and other items.
HIA-1	H - Isolated bottle base and lower body (lime green)	<1	Not eligible	Lower body embossed with "Franseria Bros. Winery, Ripon, CA."
HIA-2	H - Isolated can	<1	Not eligible	Hole-in-top can.
HIA-3	H - Isolated enamelware teapot	<1	Not eligible	–

(1) Four adits, two mine shafts, and six prospects were also observed. ~~during the field survey~~.

(2) Site CA-INY-4814-H and Isolates HIA-1a through HIA-18a were recorded in the adjacent offsite survey (Stoner and Mehls, 1994).

~~(2)~~ (3) H = Historic; P = Prehistoric.

~~(3)~~ (4) Formal National Register eligibility determinations are made by the federal agency (BLM) in consultation with the SHPO, as regulated by 36 CFR Part 800 to fulfill the requirements of NHPA. The recommendations in this column are presented in the technical reports (Rusco et al., 1993; Mehls and Lennon, 1993; Stoner and Mehls, 1994), and will be provided to SHPO by BLM. Compliance with Section 106 of NHPA is the responsibility of BLM, as the lead agency for cultural resources. SHPO consultation will be completed prior to the Record of Decision for the Proposed Action.

TABLE 3.9.1

CULTURAL RESOURCE INVENTORY AND SIGNIFICANCE EVALUATION
(Continued)

SITE/ISOLATE NUMBER(1)(2)	SITE TYPE~~(2)~~(3)	SITE AREA (m^2)	NATIONAL REGISTER ELIGIBILITY RECOMMENDATION~~(3)~~(4)	REMARKS
HIA-4	H - Isolated window screen fragment	<1	Not eligible	–
HIA-5	H - Isolated vent hole can and a tin bucket	<1	Not eligible	–
HIA-1a	H - Isolated can	<1	Not eligible	Hole-in-cap can.
HIA-2a	H - Isolated can	<1	Not eligible	Hole-in-cap can.
HIA-3a	H - Isolated hearth	<1	Not eligible	Hearth with melted clear glass.
HIA-4a	H - Isolated can	<1	Not eligible	Talcum powder can.
HIA-5a	H - Isolated can	<1	Not eligible	Hole-in-cap can.
HIA-6a	H - Isolated can	<1	Not eligible	Baking powder tin.
HIA-7a	H - Isolated horseshoe fragment	<1	Not eligible	–
HIA-8a	H - Isolated metal tank	<1	Not eligible	Remains of large, galvanized tank.

(1) Four adits, two mine shafts, and six prospects were also observed. ~~during the field survey~~.

(2) Site CA-INY-4814-H and Isolates HIA-1a through HIA-18a were recorded in the adjacent offsite survey (Stoner and Mehls, 1994).

~~(2)~~ (3) H = Historic; P = Prehistoric.

~~(3)~~ (4) Formal National Register eligibility determinations are made by the federal agency (BLM) in consultation with the SHPO, as regulated by 36 CFR Part 800 to fulfill the requirements of NHPA. The recommendations in this column are presented in the technical reports (Rusco et al., 1993; Mehls and Lennon, 1993; Stoner and Mehls, 1994), and will be provided to SHPO by BLM. Compliance with Section 106 of NHPA is the responsibility of BLM, as the lead agency for cultural resources. SHPO consultation will be completed prior to the Record of Decision for the Proposed Action.

TABLE 3.9.1

CULTURAL RESOURCE INVENTORY AND SIGNIFICANCE EVALUATION
(Continued)

SITE/ISOLATE NUMBER(1)(2)	SITE TYPE~~(2)~~(3)	SITE AREA (m^2)	NATIONAL REGISTER ELIGIBILITY RECOMMENDATION~~(3)~~(4)	REMARKS
HIA-9a	H - Isolated metal tank	<1	Not eligible	Corrugated galvanized tank, 1.25 m diameter, with cone-shaped bottom.
HIA-10a	H - Isolated can	<1	Not eligible	Hole-in-cap can.
HIA-11a	H - Isolated hearth	<1	Not eligible	Stone circle hearth, 1 m diameter.
HIA-12a	H - Isolated hearth	<1	Not eligible	Stone circle hearth, 0.5 m diameter.
HIA-13a	H - Isolated hearth	<1	Not eligible	Stone circle hearth, 0.25 m diameter.
HIA-14a	H - Isolated metal bucket	<1	Not eligible	–
HIA-15a	H - Isolated can lid	<1	Not eligible	From hole-in-cap can, side-strip-opened with key.
HIA-16a	H - Isolated coffee pot	<1	Not eligible	Blue enamel coffee pot.
HIA-17a	H - Isolated can	<1	Not eligible	Hole-in-cap can.
HIA-18a	H - Isolated stove fragment	<1	Not eligible	Cast-iron stove fragment, part of base.

92-274 (4/28/95/cm)

(1) Four adits, two mine shafts, and six prospects were also observed. ~~during the field survey~~.

(2) Site CA-INY-4814-H and Isolates HIA-1a through HIA-18a were recorded in the adjacent offsite survey (Stoner and Mehls, 1994).

~~(2)~~ (3) H = Historic; P = Prehistoric.

~~(3)~~ (4) Formal National Register eligibility determinations are made by the federal agency (BLM) in consultation with the SHPO, as regulated by 36 CFR Part 800 to fulfill the requirements of NHPA. The recommendations in this column are presented in the technical reports (Rusco et al., 1993; Mehls and Lennon, 1993; Stoner and Mehls, 1994), and will be provided to SHPO by BLM. Compliance with Section 106 of NHPA is the responsibility of BLM, as the lead agency for cultural resources. SHPO consultation will be completed prior to the Record of Decision for the Proposed Action.

6. Sites CA-INY-4582-H, CA-INY-4583-H, and CA-INY-4584-H are trash scatters, the first two of which contain ten items or less each. The third site (CA-INY-4584-H) contains two concentrations of historic debris composed of hundreds of artifacts such as cans, bedsprings, glass, shell casings, bricks, nails, and many other data classes.

7. Historic site CA-INY-4585-H is a mining complex with seven features located in Redlands Canyon. The cultural features include an assay area, wooden cribbing, a change house, cement and compressor platforms, a mine adit, a retaining wall, and a powder magazine.

8. Historic site CA-INY-4814-H is the Gold Tooth Mine and Mill complex with 43 features, located outside the boundary of the project site. The cultural features include adits, stopes, structural remains, foundations, trails, mill remains, aerial tram tower and terminal, ore chute and rail system, rock retaining wall, and stairway.

~~8.~~ 9. Three sites in the Briggs Project area provide evidence of historic travel locally or regionally. Site CA-INY-4684-H contains three noncontiguous segments of the historic route of the Bennett-Arcan Party led by William Manly. These segments vary in width from 12 to 18 inches and are 63 feet, 130 feet, and 450 feet in length, respectively. Site CA-INY-4685-H is a segment of a wagon road or two-track motor road. Varying in width from 6 to 10 feet, the segment is 160 feet long and probably once extended from Briggs Camp to Wingate Road on the valley floor. A complex of miners' trails or footpaths is identified as site CA-INY-4686-H. Providing access to mine workings or prospects, the trails vary in width from 3 to 6 feet and in length from just a few feet to 300 yards. Three retaining walls are associated with the trail complex.

~~9.~~ 10. An historic rock ring containing melted historic glass, wire nails, staples, a battery, and bone fragments ~~were~~ was recorded as resource HF-1. ~~Five~~ An additional four historic hearths, nineteen historic isolates, two mine shafts (shafts 1 and 2), four adits, and six prospects were also recorded in the project area.

3.9.2.2 Cultural Resource Significance

1. The evaluation of cultural resource significance is required by federal (NHPA) and state (CEQA) law because only significant (NHPA) or important (CEQA) sites are considered in assessment of the potential of a Proposed Action to adversely affect the cultural environment. The criteria for evaluation of resource significance are quite similar between state and federal

guidelines, except that federal regulations require a property to be at least 50 years old, while state guidelines require a minimum 100 year age. To streamline regulatory compliance, CEQA provides for the use of federal regulations for the evaluation and management of cultural resources when a federal action is part of project approval. Since this condition applies to the Proposed Action, the significance of sites for assessments related to the Briggs Project was evaluated using federal guidelines.

~~1.~~2. Cultural resource significance evaluations are made with reference to the ability of a site or related group of sites to meet the criteria for eligibility to the NRHP. As stated in 36 CFR Part 60.4, these criteria are as follows:

- The quality of significance in American history, architecture, archeology, and culture is present in districts, sites, buildings, structures, and objects of state and local importance that possess integrity of location, design, setting, materials, workmanship, feeling and association, and:
  - (a) that are associated with events that have made a significant contribution to the broad patterns of our history; or
  - (b) that are associated with the lives of persons significant in our past; or
  - (c) that embody the distinctive characteristics of a type, period, method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack distinction; or
  - (d) that have yielded, or may be likely to yield, information important to prehistory or history.

~~2.~~3. Recommendations for NRHP eligibility status are included in Table 3.9.1. These recommendations are consistent with those of the cultural resource technical reports (Rusco et al., 1993; Mehls and Lennon, 1993; Stoner and Mehls, 1994), and will be presented by the BLM to SHPO during Section 106 consultation pursuant to the NHPA. The two prehistoric rock alignments with associated trail segments (sites CA-INY-4643 and CA-INY-4644) on the lower portion of the alluvial fan are recommended as eligible for NRHP listing for their information potential under criterion 60.4(d). These two sites form a comparable body of data for the more numerous northern Panamint Basin resources of the same site type. They may yield important information on the relationships between the northern and southern valley which, during ethnohistoric and probably late prehistoric times, supported distinct ethnographic populations. The association of the rock configurations with aboriginal trails may yield further information on northern and southern Panamint Valley and intervalley interactions (especially travel and exchange networks) during prehistory.

4. The historic Gold Tooth Mine site and milling complex (site CA-INY-4814-H), adjacent to the southern boundary of the project site, is recommended as eligible for NRHP listing for its information potential under criterion 60.4(d). The site provides information on the spatial layout and operation of an early twentieth century mining and milling operation. It is associated with the context of mining in the Panamint area and with the context of small, subsistence mining in the Panamint Valley during the Great Depression. Certain features of the site also have the potential to offer data about the households of miners of the Panamint/Ballarat area early in the twentieth century and during the Great Depression.

~~3.~~5. Sections of an historic resource in the Briggs Project area are identified as noncontributing elements of a potentially significant historic property. The historic route of the Bennett-Arcan Party was recommended as locally significant and potentially eligible for NRHP listing under criterion 60.4(b) for its association with the career of adventurer William Manly. The sections of the property in the Briggs Project area, however, lack integrity of design, setting, and feeling because the three noncontiguous segments are less than one-eighth mile in total length and resemble game trails (see NRHP criteria for listing [36 CFR Part 60.4], cited in full in the first paragraph of this section). Additionally, the setting has been altered by mining-related activities and natural erosion processes.

~~4.~~ 6. The remaining recorded historic period resources are recommended as not eligible for NRHP listing due to a lack of resource integrity, site association with a period not considered historically significant, or the lack of significant information potential.

~~5.~~ 7. Only significant cultural resources are considered in terms of potential adverse impacts that could result from implementation of the Proposed Action or alternatives. Consideration is made consistent with Section 106 of the NHPA and is regulated by the 36 CFR Part 800 procedures (Procedures for the Protection of Historic Properties). Following BLM and SHPO concurrence in the insignificance of the recorded historic period remains in the project area, only sites CA-INY-4643, ~~and~~ CA-INY-4644, and CA-INY-4814-H would require further consideration in terms of potential adverse impacts of the Proposed Action or alternatives (see Section 4.9). The avoidance and protection of these ~~two~~ three sites~~, and their protection through fencing,~~ are integral ~~factors of~~ to the Proposed Action and alternatives. These three sites are located outside of areas where surface disturbance would occur.

3.10 TRANSPORTATION

1. The primary transportation corridor pertinent to the proposed Briggs Project is the highway that connects Panamint Valley to the Ridgecrest area. This highway is State Route 178 east of Ridgecrest, which turns into Trona-Wildrose Road near Searles Lake (Figure 3.10.1) and continues through Panamint Valley.

2. State Route 178 is a two lane paved road with a 24-foot travel width, plus 1- to 2-foot shoulders (Walton, 1993). Based on a 1992 count, the average daily traffic (ADT) on the segment east of Ridgecrest is about 2,000, which is between 70 and 80 percent of the design capacity. There are no special vehicle weight or size restrictions for this highway. Oversize loads are subject to state regulatory requirements, including the need for permits and appropriate safety measures. The highway traverses generally open terrain, with good driving conditions and good visibility.

3. Trona-Wildrose Road is a County-maintained two lane paved highway providing a north-south route through Panamint Valley. State Route 178 and Trona-Wildrose Road is the most direct route to Death Valley from the southwest (e.g., from the Los Angeles area). However, because of the lack of development in the region, the frequency of travel on Trona-Wildrose Road is minimal. The last traffic count on this road showed an ADT of 215 (Riesen, 1993b). This count occurred in May 1986 about four miles southwest of the Ballarat turnoff. As ~~for~~ with State Route 178, Trona-Wildrose Road has no special vehicle size or weight restrictions. Oversize loads are defined by, and subject to, state regulations, and state and County permits are required.

4. For the most part, Trona-Wildrose Road traverses open terrain with good driving conditions and good visibility. The travel width is generally about 22 to 24 feet with about 8-foot unpaved shoulders. At the Slate Range crossing (Figure 3.10.1), however, the grade is deceptively steep (maximum grade is about 7 percent) and there are several tight turns requiring that reduced speeds and caution be used for safe travel. Except for turnouts, shoulders are narrow or not present at steeper parts of the crossing. Trona-Wildrose Road also traverses adverse terrain at its north end near Highway 190. Large vehicles can have a difficult time turning around in this area (Riesen, 1993b).

5. Access to the site from Trona-Wildrose Road is over graded dirt roads. These include Ballarat and Wingate roads (Figure 2.19) which are also maintained by the County. The surface condition of these two roads varies considerably primarily depending on length of time since

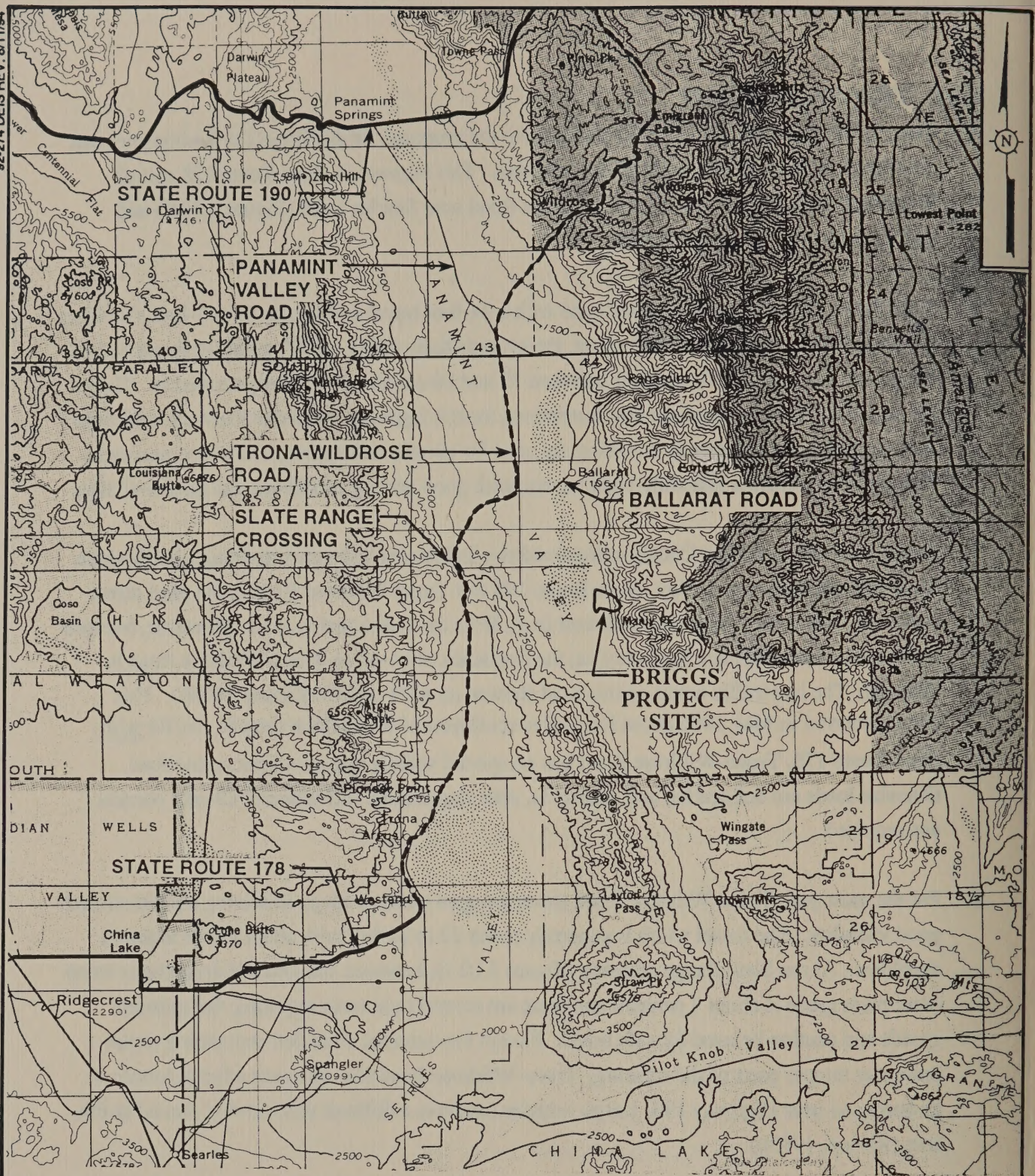


FIGURE 3.10.1

VICINITY HIGHWAYS

BRIGGS PROJECT

LEGEND

STATE HIGHWAY

COUNTY HIGHWAY

REFERENCE:

1. USGS MAP OF THE STATE OF CALIFORNIA, SOUTH HALF, 1:500,000, COMPILED IN 1968, REVISED 1981.

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grading, with "washboarding" being a primary concern. Traffic counts are not kept for these roads. ADT on Wingate Road in the Briggs Project vicinity has been estimated at less than 25 vehicles per day (Air Sciences, Inc., 1994). Traffic on Ballarat Road may be slightly higher.

6. Ballarat Road is a straight two-lane road with a graded width of approximately 30 to 35 feet and a maintained travel surface about 20 to 24 feet wide. It provides access to the ~~historic~~ old mining town of Ballarat where it intersects Wingate Road. About one mile of Ballarat Road where it crosses the playa consists of an approximately 24-inch high fill. Wingate Road generally follows the topography of the alluvial fans along the east side of Panamint Valley and is approximately 20 feet wide. Although this road curves considerably to follow topography, the curves and topography are relatively gentle and do not severely effect the line of sight for safe travel at moderate speeds. One exception occurs at a turn about 1.5 miles south of Ballarat where the road traverses between the foot of a rock scarp and Post Office Spring. Reduced speed is required at this turn because the rock scarp limits visibility of possible oncoming traffic.

7. Dust from travel on Ballarat and Wingate roads can effect driving visibility when vehicles travel in succession. This can create a hazard if proper caution is not exercised.

8. As discussed in Section 2.2.2.5.5, it is expected that ridesharing to the project site will occur. There is a Caltrans Park & Ride facility located on Highway 178 in Ridgecrest. This lot currently fills beyond its design capacity, resulting in some patrons parking in unimproved areas.

3.11 NOISE

1. Activities surrounding the project area contribute to widely variable noise events. Common naturally-occurring noise levels in the area are low and generally due to wind and wildlife. Human-induced noise sources include:

   - Military overflights.
   - Recreational and off-road vehicles in the area, primarily on weekends and holidays.
   - Operation of drill rigs and earth moving equipment used in the exploratory program at the Briggs Project site.
   - Other mineral exploration activities including drilling, helicopter overflights, etc.

   Such activities have been ongoing and are expected to continue.

2. Military overflight constitutes the primary source of high level noise incidents in the vicinity. ~~The~~ As discussed in Section 3.7.3.5, the southern Panamint Valley is within a joint service restricted airspace complex and is designated as a Military Operations Area that permits aircraft to fly at speeds exceeding 250 knots at all altitudes 200 feet above ground level or higher (CLNAWS, 1993). The Military Operations Area is used on a daily basis by Navy and Air Force aircraft. Low level overflights of various military aircraft are common. Land status changes proposed under the DPA (i.e., proposed wilderness and the proposed Death Valley National Park) would not limit military overflight in these areas.

3. Although the Panamint Military Operations Area is not currently designated for supersonic activity, sonic booms may be heard from flight operations in nearby restricted airspace. Future use of this area for supersonic operations is not considered an impact to the proposed project.

~~3.~~ 4. Noise from other human-induced sources is generally localized due to attenuation by distance, topography and atmospheric conditions.

~~4.~~ 5. There are no sensitive receptors near the site location. The nearest residence is in Ballarat, about seven miles north. Wildlife in the area that may be affected by noise from project activities is addressed in Sections 3.5 and 4.5.

3.12 SOCIOECONOMICS

1. The existing and projected socioeconomic characteristics of areas that could be affected by the Proposed Action are reviewed in this section. The factors discussed here that contribute to the socioeconomic environment include: employment, population, income, housing, schools, and public utilities and services. Data were derived from a number of sources, primarily local organizations and agencies.

2. As discussed in Section 1.2, the project site is located in Inyo County (Figure 1.1). The nearest population centers are Trona (in San Bernardino County), and Ridgecrest and Inyokern (in Kern County). These communities lie just outside the boundary of the CLNAWS. As discussed below, CLNAWS is the primary influence on the socioeconomic environment of these communities.

3. It is expected that most construction and operations employees would reside in Ridgecrest, with some choosing to live in Inyokern and Trona. Much of the economic impact related to mine revenues would occur in Inyo County, where the project is located. Other impacts, especially those related to revenues and expenses associated with mine-related population, are expected to occur primarily in Kern and San Bernardino counties. For these reasons, the existing environment section concentrates on the communities of Ridgecrest, Inyokern, and Trona, thereby providing appropriate background information for the impacts discussed in Section 4.12.

3.12.1 ECONOMY AND EMPLOYMENT

1. A comparison of wage and salary employment for Kern and Inyo/Mono counties for the past two years is shown in Table 3.12.1 (California Employment Development Department combines the statistics for Inyo and Mono counties.) As indicated in the table, the largest individual industry for Kern County is agriculture, which represents about 26 percent of total employment, followed by government (19 percent), services (18 percent), and retail trade (15 percent). Mining represents about 5 percent of total employment for Kern County. For Inyo/Mono counties, the largest individual industry is services, with about 39 percent of total employment, followed by retail trade (24 percent), and government (22 percent).

2. Labor force data for the past two years for Kern and Inyo/Mono counties are shown in Table 3.12.2. As shown, Kern County experienced a growth in the labor force and in total

TABLE 3.12.1

KERN COUNTY AND INYO/MONO COUNTIES
WAGE AND SALARY EMPLOYMENT BY INDUSTRY
(In Thousands)[1]

TYPE OF INDUSTRY	INYO/MONO COUNTIES[2]				KERN COUNTY			
	September 1993	Percent of Total	September 1992	Percent of Total	September 1993	Percent of Total	September 1992	Percent of Total
Agriculture	0.1	0.7	0.1	0.8	59.6	25.6	36.7	17.3
Goods-Producing Industries								
• Mining	0.5[3]	3.7[3]	0.3	2.4	11.2	4.8	11.7	5.5
• Construction	0.4	3.0	0.4	3.2	9.2	3.9	9.1	4.3
• Manufacturing								
- Durables								
• Machinery and Electrical Equipment	–	–	–	–	0.9	0.3	0.9	0.4
• Other Durables	–	–	–	–	2.9	1.2	2.9	1.3
• Transportation Equipment	–	–	–	–	1.8	0.7	1.9	0.9
- Nondurables								
• Food and Kindred Products	–	–	–	–	2.2	0.9	1.9	0.9
• Chemicals and Petroleum	–	–	–	–	1.3	0.5	1.2	0.5
• Other Nondurable Goods	–	–	–	–	1.6	0.6	1.7	0.8
Manufacturing Subtotal	--[3]	--[3]	**0.3**	**2.4**	**10.7**	**4.5**	**10.5**	**4.9**
Goods-Producing Industries Total	--	--	--	--	**31.1**	**13.3**	**31.3**	**14.8**
Services-Producing Industries								
• Transportation and Public Utilities	0.4	3.0	0.3	2.4	8.3	3.5	8.5	4.0
• Wholesale Trade	0.3	2.2	0.3	2.4	7.6	3.2	8.1	3.8
• Retail Trade	3.2	23.7	3.2	25.4	34.0	14.6	33.4	15.8
• Finance, Insurance and Real Estate	0.6	4.4	0.5	4.0	5.6	2.4	5.7	2.7
• Services	5.2	38.5	4.1	32.5	41.5	17.8	40.9	19.3
• Government[4]								
- Federal	0.6	4.4	0.6	4.8	11.8	5.0	12.1	5.7
- State and Local	2.3	17.0	2.6	20.6	33.2	14.2	34.4	16.2
Government Subtotal	**2.9**	**21.5**	**3.1**	**24.6**	**45.0**	**19.3**	**46.5**	**22.0**
Services-Producing Industries Subtotal	--	--	--	--	**142.0**	**61.0**	**143.1**	**67.7**
TOTAL EMPLOYMENT	**13.5**	**100.0**	**12.6**	**100.0**	**232.7**	**100.0**	**211.1**	**100.0**

92-274 (8/12/94/lk)

Source: California Employment Development Department, 1993.

(1) Totals may not add due to independent rounding. Employment is reported by place of work and excludes self employed workers, unpaid family workers, and workers involved in labor disputes.
(2) Data for Inyo and Mono counties are reported by the state as one.
(3) For Inyo/Mono counties, mining and manufacturing are combined for 1993.
(4) Includes all civilian government employees regardless of activity in which engaged.

TABLE 3.12.2

SELECTED EMPLOYMENT STATISTICS INYO/MONO COUNTIES AND KERN COUNTY

EMPLOYMENT PARAMETER	INYO/MONO COUNTIES[1]		KERN COUNTY	
	September 1992	September 1993	September 1992	September 1993
Civilian Labor Force[2]	14,400	15,025	277,300	286,200
Employment	13,075	13,750	237,800	248,100
Unemployment	1,325	1,250	39,500	38,100
Unemployment Rate (%)	9.2	10.0	14.3	13.3

92-274 (8/12/94/lk)

Source: California Employment Development Department, 1993.

(1) Data for Inyo County is combined with Mono County. Separate data are not available from California Employment Development Department.

(2) Labor force is by place of residence. Employment includes persons involved in labor-management disputes.

employment and a decrease in unemployment from September 1992 to September 1993. At the same time, for Inyo/Mono counties, there were increases in the labor force and total employment, but also in the unemployment rate. The 1993 unemployment rates for Inyo/Mono counties and Kern County were 10.0 and 13.3 percent, respectively. The unemployment rate for Ridgecrest in 1993 was 7.1 percent. For comparison, the 1993 unemployment rates for California and the United States were about 9.1 and 6.4 percent, respectively (California Employment Development Department, 1993).

3. Employment in the Ridgecrest area is dominated by the CLNAWS, with a work force of about 6,000 (Farlander, 1993). In addition, four manufacturing plants in the area (North American Chemical Company, Comarco, Martin Marietta and Texas Instruments) employ more than 2,000 persons. Local nonmanufacturing employers that are associated with CLNAWS include: General Dynamics, Raytheon, Honeywell, IBM, Continental Graphics, Hughes Aircraft, NSI Technology Services Corporation, Local Computer Technology Associates, McDonald Aircraft, Digital Equipment Corporation, Boeing Computer Services, Johnson Control/World Services, and Electronic Warfare Associates (Ridgecrest Chamber of Commerce, 1993b).

4. The role of the CLNAWS is illustrated in Table 3.12.3, which shows gross payrolls for 1992. As shown, payroll associated with CLNAWS comprises about 80 percent of the total payroll for the Ridgecrest area.

3.12.2 POPULATION AND DEMOGRAPHY

1. Population estimates for the Kern County and Ridgecrest area are shown in Table 3.12.4. The county population has shown an average annual increase of about 2.5 percent since 1950, while the population of Ridgecrest has increased, on average, about 9.7 percent per year. Between 1950 and 1992, county population increased one and one-half times, while the population of Ridgecrest increased more than 14 times.

2. The population of Inyokern is about 10,800 (McGlothin, 1993). Trona is estimated to have a population of about 2,200 (Garrison, 1993). This is a decline from earlier estimates of about 3,400 (McGlothin, 1993), due to a recent layoff at North American Chemical Corporation, located in Trona (Garrison, 1993).

TABLE 3.12.3

RIDGECREST AREA
1992 ESTIMATED GROSS PAYROLL

EMPLOYER	AMOUNT
CLNAWS (Civilian, Military, Local Contractors)	$348,700,000
North American Chemical Company	$36,000,000
Sierra Sands Unified School District ('91 - '92)	$23,108,120
California Energy Company(1)	$9,000,000
Ridgecrest Community Hospital	$8,811,098
City of Ridgecrest	$4,655,811
Cerro Coso Community College	$4,374,201
Rand Mining(2)	$2,600,000
Post Office	$2,000,000
Utilities (local)	
• PG&E	$796,350
• SCE	$1,258,700
• Contel	$3,600,000
• Indian Wells Valley Water District	$1,317,757
Total Ridgecrest Area Payroll	$434,622,037
Annual Average Income (1993 per household)	$43,069
Annual Median Income (1993 per household)	$39,087

92-274 (8/12/94/lk)

Source: Ridgecrest Chamber of Commerce, 1993b, except where otherwise noted.

(1) Source: Cox, 1994. Not included in calculations of average and median incomes.

(2) Source: Rand Mining Company, 1994. Reflects period of July 1992 to June 1993. Not included in calculations of average and median incomes.

TABLE 3.12.4

ESTIMATED POPULATION STATISTICS KERN COUNTY AND RIDGECREST 1950 - 1992

YEAR	KERN COUNTY		RIDGECREST		
	Population	Percent Increase	Population	Percent Increase	Percent of County Population
1950	228,309	--	2,028	--	0.9
1960	291,984	28	5,467	170	1.9
1970	330,234	13	7,629	40	2.3
1980	403,089(1)	22	15,929	109	4.0
1990	543,477	35	30,350	91	5.6
1992	584,086	7	29,313	(3)(2)	5.0

92-274 (8/12/94/lk)

Source: Ridgecrest Chamber of Commerce, 1993b, except where otherwise noted.

(1) Ball, 1993.
(2) Parentheses indicate decrease.

3.12.3 HOUSING

1. Ridgecrest contains a variety of housing options that include permanent and temporary structures. There are single-family homes, as well as mobile homes, apartments, and duplexes. The average sale price of an existing home is about $100,000, with prices ranging from about $50,000 to more than $150,000. Mobile homes are priced from about $35,000. Rates for one- and two-bedroom apartments and duplexes range from $350 to $650 per month, while those for two- and three-bedroom houses begin at about $500 (Ridgecrest Chamber of Commerce, 1993b). Housing is expected to be readily available; the Indian Wells Valley Water District reports that about 400 empty homes are on their system (Tucker, 1993).

2. Temporary housing in the Ridgecrest area is available at 16 hotels and motels, with about 886 rooms. There also are 15 mobile home parks, and six RV parks and camping areas (Ridgecrest Chamber of Commerce, 1993b).

3. Housing in Inyokern also is readily available. Rental rates for one- and two-bedroom apartments, duplexes and mobile homes range from $250 to $450 per month. Rates for two- and three-bedroom houses range from $475 to $1,000 per month. Sale prices of existing homes range from about $65,000 to $110,000, with numerous residential areas within five miles of town offering homes priced from $65,000 to $100,000 (Inyokern Chamber of Commerce, 1988). These rates and prices have been stable over the past several years, and the current situation is considered a "buyer's" market (Fiddament, 1993).

4. Housing in Trona consists primarily of single family homes, and there are some apartments. Prices for two- and three-bedroom homes, many on double lots, range from about $40,000 to $60,000. In addition, there are many homes in foreclosure, available for an estimated $25,000 to $30,000 (Garrison, 1993).

3.12.4 SCHOOLS

1. The Sierra Sands Unified School District serves Ridgecrest, Inyokern, China Lake, Randsburg, and Johannesburg. The district operates eight elementary schools, two junior high schools, and two high schools. The student/teacher ratio is about 31 students per teacher, which is considered high. The district reports that its schools are at capacity at all grades. The district currently has applications on file with the state of California for an additional elementary school, middle school, and additions to one of the high schools

(Auld, 1993). In addition, the Ridgecrest area has seven parochial schools and Cerro Coso Community College, a two-year school (Ridgecrest Chamber of Commerce, 1993b).

2. The Trona Joint Unified School District serves the Trona area with an elementary school and a high school. Enrollment is about 640 students, and the schools are generally at or below capacity. Although overall enrollment is decreasing, modernization of the high school is in the planning stages (Copeland, 1993).

3.12.5 UTILITIES AND SERVICES

3.12.5.1 Water Supply and Distribution

1. The Ridgecrest area is served by the Indian Wells Valley Water District, which produces about 7,500 acre-feet of water annually for its 10,666 customers. Average customer use is 0.7 acre-feet per year. About 400 empty homes are connected to the system, and the district has the capacity for an additional 1,200 homes. System capacity and distribution can both be increased as needed, and the district is pursuing importation as an additional source of water. There also is a conservation program that is expected to slightly reduce per-customer usage (Tucker, 1993).

2. The Inyokern Community Services District provides water for the Inyokern community. All aspects of the water supply system, except for the wells, were recently replaced. There are 315 customers on the system, which now has a capacity of 550 customers (Ernst, 1993).

3. Water for the Trona area is provided by the Searles Domestic Water Company, which obtains its water from the Indian Wells Valley aquifer. The system is connected to surplus housing that could be occupied by new residents, but the current water supply would not support other expansion. There are no plans to expand the capacity of the existing water supply and distribution system (Stribling, 1993).

3.12.5.2 Wastewater Treatment and Disposal

1. The City of Ridgecrest sewage treatment plant has a capacity of about 3.6 million gpd and currently processes about 3.2 million gpd. The system, constructed during the early 1940s, is essentially at capacity and in need of upgrading and expansion (Turner, 1993).

2. The Inyokern Community Services District provides for wastewater treatment and disposal. The existing system is at capacity, at 70,000 gpd. The system is planned to be expanded and upgraded to almost twice the existing capacity by about September 1994 (Ernst, 1993).

3. Trona is in San Bernardino County Service Area No. 82 and utilizes a community sewer system that has a capacity of 90,000 gpd and currently operates at about 65 to 70 percent of capacity. This includes inflow from the school, which has a 12,000 gallon septic tank, and from two other 8,000 gallon tanks in Searles. Therefore, there is adequate capacity in the Trona area (Songer, 1993).

3.12.5.3 Natural Gas

1. Pacific Gas and Electric (PG&E) supplies natural gas to Ridgecrest, Inyokern and Trona. Existing resource supply and delivery systems are adequate to serve the existing population, and the system could be readily expanded for additional population (PG&E, 1993).

3.12.5.4 Electricity

1. SCE supplies electricity to Ridgecrest, Inyokern, and Trona. Projecting a 2 percent growth factor on the system, existing facilities have sufficient capacity to serve new loads through 1998. There are no plans or apparent needs for major extension of SCE lines (Beck, 1993).

3.12.5.5 Telephone

1. Telephone service is provided to Ridgecrest, Inyokern and Trona by Contel of California, which provides all service needs and has no shortages. The structure of the network allows for added capacity on demand (Horton, 1993).

3.12.5.6 Solid Waste Disposal

1. Solid waste disposal for the Ridgecrest area is provided by the Class III Ridgecrest Sanitary Landfill. The facility is currently receiving waste at a rate of about 188 tpd, greater than its design capacity of 110 tpd. Anticipated closure is 2002 (Neath, 1993), although the facility has the capacity for expansion from its currently planned volume of about 3.5 million cubic

yards. An EIR is in preparation, addressing a potential increase in landfill capacity (Alvis, 1993). Current plans entail siting a regional landfill that would serve the entire northeast Kern County area and have a life of 30 to 50 years (Neath, 1993).

2. Kern County will allow disposal of solid waste from out-of-county sources located in Tulare, San Bernardino, Ventura, and Inyo counties. In the past, waste has been accepted only from government entities that demonstrate a "compelling reason" for the waste to be disposed of outside of Inyo or Tulare counties. This usually applies only to generators of small quantities of solid waste (Neath, 1993). The county has recently changed to a tipping fee structure, which may affect policy on receipt of out-of-county wastes (Berkert, 1994).

3. Inyokern utilizes the Ridgecrest Sanitary landfill.

4. Solid waste disposal for Trona and the surrounding area is provided by the Trona-Argus Sanitary Landfill. At the current fill rate of about 17 tpd, and 400,000 cubic yards of remaining capacity, there is capacity for at least the next 15 years. Total capacity of the landfill is 1.1 million tons. In accordance with San Bernardino County ordinance, there is no import of out-of-county wastes into county-owned and operated landfills unless by special arrangement (San Bernardino County, 1993).

3.12.5.7 Police and Fire Protection

1. Law enforcement within the city of Ridgecrest is provided by the Ridgecrest Police Department, which has 31 sworn officers (Narramore, 1993) and 14 nonsworn civilians (Ridgecrest Chamber of Commerce, 1993b). The area outside of the Ridgecrest city limits is served by the Kern County Sheriff's Department, from its Ridgecrest Substation, with eight sworn personnel and five nonsworn personnel (Ross, 1993). Fire protection is provided by the Kern County Fire Department, with two stations in Ridgecrest, plus a six-member volunteer group. Support from the Inyokern station and another nearby station in Randsburg (located about 20 miles south) is provided on an as-needed basis (Allington, 1993).

2. Law enforcement in Inyokern is provided from the Ridgecrest Sheriff's Department substation. Fire protection is provided by the Kern County Fire Department engine company in Inyokern, plus a 12-member volunteer engine company. Support from the Ridgecrest and Randsburg fire stations is provided on an as-needed basis (Allington, 1993).

3. In Trona, police protection is provided by the San Bernardino County Sheriff's Department from a station located in Trona. There are two deputies adequate for the existing (declining) population (Garrison, 1993). Fire protection is provided by the North American Chemical Corporation Fire Brigade and the ~~California Department of Forestry volunteer program,~~ Searles Valley Volunteer Fire Department in Trona (Allington, 1993). The Searles Valley Volunteer Fire Department is a paid-call agency under the "umbrella" of the San Bernardino County Fire Department (Lemaster, 1995) with 15 volunteers and three engines, three ambulances and one rescue squad. There is a mutual aid agreement between the two fire departments, and Searles Valley Volunteer Fire Department has an agreement with Kern County, especially for calls from Death Valley (Aguilar, 1993).

3.12.5.8 Health Care

1. The Ridgecrest Community Hospital serves Ridgecrest and the surrounding area, including Inyokern and Trona. The hospital is an 80-bed acute-care facility (Ridgecrest Community Hospital, 1993), fully staffed by 19 physicians/surgeons. Specialists in a variety of services visit on a regular basis. The hospital includes emergency and intensive care-units and heliport emergency services. The Ridgecrest community also has several medical clinics and counseling centers and a 90-bed convalescent hospital (Ridgecrest Chamber of Commerce, 1993b).

2. Persons living in Inyokern go to Ridgecrest for medial care, as there are no doctors in Inyokern. There is one physician in Trona (Ridgecrest Community Hospital, 1993).

3.12.5.9 Briggs Mine Site

1. Because the Briggs Project site is located in an undeveloped portion of Inyo County, there are no services or facilities at the site. The Briggs Project would provide its own power, electricity, telephone, water supply and wastewater treatment and disposal. Solid waste would likely be contracted to a licensed hauler for disposal. Municipal solid waste landfills available to accept project wastes are the Lone Pine Landfill and the Bishop Sunland Landfill in Inyo County and, by special agreement, the Ridgecrest Sanitary Landfill in Kern County, or the Trona-Argus landfill in San Bernardino County.

2. There would be provision at the mine for onsite security, fire protection and emergency medical response. The Briggs Project site is within an area patrolled by the Inyo County Sheriff's Department, California Highway Patrol and BLM Rangers. It is also within the

service area of the San Bernardino County Fire ~~Agency~~ Department, which provides fire suppression and emergency medical treatment. Estimated response time from the nearest station (Searles Valley Fire Department in Trona) to the Briggs Project site by a ground ambulance is 45 to 50 minutes (Lemaster, 1995) and 80 minutes for a fire engine (Reyes, 1993). The San Bernardino County Fire ~~Agency~~ Department could provide fire and medical response to the site under a cooperative agreement with Inyo County.

3. Response time from the Kern County Fire Department in Ridgecrest to the project site is estimated to be about 100 minutes. This estimate is based on the following: the Kern County Fire Department response formula of 2 minutes start-up time, plus an estimated 1.2 minutes per road mile (Scott, 1995) for an approximate 50-mile paved road travel distance between Ridgecrest and the project site, plus about 40 minutes for travel over the Ballarat and Wingate dirt roads. All Kern County Fire Department personnel have EMT training, but the Fire Department does not transport medical emergencies (Scott, 1995). The Kern County Fire Department ~~also~~ could provide fire and medical response under a cooperative agreement directly with Canyon (Clark, 1993). ~~Anticipated response time would be about 40 minutes.~~

3.12.6 TAXES AND REVENUES

1. The three primary jurisdictions for accrual and disbursement of mine-related monies are Inyo, Kern, and San Bernardino counties. The Briggs Project site is located in Inyo County. The areas where most of the project construction and operations personnel are expected to reside are Ridgecrest and Inyokern, in Kern County. A portion of the work force may reside in the Trona area, located in San Bernardino County.

~~2. Three types of taxes will accrue to state and local jurisdictions as a result of the proposed Briggs Project: net proceeds, ad valorem, and sales/use taxes. The project site will be assessed a property tax at the rate of 1 percent, to be applied annually to the net income of the facility (Rothermel, 1993). Ad valorem (property) taxes are levied on improvements (land, structures), plus personal property, fixtures, etc. The state determines a taxable value, usually market value (replacement less depreciation). In California, the rate is 7 percent of assessed value. Ad valorem taxes would accrue to the appropriate local jurisdiction from development of the mine and from residential property purchased by incoming population associated with the Briggs Project.~~

2. Three types of taxes would accrue to state and local jurisdictions as a result of the proposed Briggs Project: state income, ad valorem (property), and sales/use taxes. Property tax would be assessed on all property at the mine site, including the possessory interest in land, mineral rights, improvements, fixtures, and personal property. It is the responsibility of the County to determine a taxable value, which is subject to periodic review by the State Board of Equalization. The taxable value is determined annually as of March 1 and cannot exceed market value of the project. In California, the taxable value is calculated at the rate of 1 percent of assessed value. Property taxes would accrue to appropriate local jurisdictions, including counties, cities, school districts and other special districts, from development of the Briggs Project and from any residential property that is purchased by associated incoming population.

3. Two sources of sales tax revenues would be associated with the Briggs Project: (1) tax on retail and capital improvement purchases; and (2) personal purchases by employees, families, and others associated with the project. The sales tax rate in Kern County is 7.25 percent, and in Inyo and San Bernardino counties is 7.75 percent. Of these amounts, 6.25 percent is retained by the state, with the remainder going to the county and, as appropriate, the local jurisdiction where the purchase was made (Rothermel, 1993).

3.13 ENVIRONMENTAL HEALTH AND SAFETY

1. Existing environmental health and safety-related conditions in the site vicinity are primarily related to the following:
   - Travel on roads traversing the area.
   - Historic mine workings unrelated to the Proposed Action.
   - Ongoing exploration by Canyon.
   - Natural hazards, including the steep topography of the Panamint Range.

2. Several maintained and unmaintained dirt roads traverse Panamint Valley and a few canyons within the Panamint Range. Driving conditions on these roads are variable and can be hazardous at excessive speeds. Dust from travel on these dirt roads can effect visibility for vehicles traveling in succession, and small dust particles (i.e., PM_{10}) are respirable and can be a health hazard.

3. Numerous mine workings occur in the Briggs Project vicinity. Adits remain open and can pose an interest and hazard for occasional recreationalists in the area. A small abandoned mill site and several areas of debris are also present, but are being removed.

4. Current exploration in the area by Canyon is occurring in compliance with MSHA regulations. Activities include temporary road grading and exploratory drilling.

5. The steep natural topography of the Panamint Range may represent the greatest hazard. Slopes in the Briggs Project vicinity are very steep and often exceed 100 percent. Near-vertical slopes occur in some areas of Redlands Canyon and other nearby canyons. The steep slopes limit recreational use of the area and require that caution be exercised in slope areas.

6. Other hazards also exist that are typical of California desert areas. These include seasonally excessive heat, wildlife (e.g., rattlesnakes), and during infrequent rainfall events, potential for flash floods.

CHAPTER 4.0
POTENTIAL ENVIRONMENTAL IMPACTS

4.0 POTENTIAL ENVIRONMENTAL IMPACTS

4.1 INTRODUCTION

4.1.1 GENERAL PARAMETERS OF IMPACT ASSESSMENT

1. This chapter and Chapter 5.0 form the scientific and analytic basis for the analysis of the Proposed Action and alternatives. ~~It~~ They discusses potential effects on the existing environment that could occur from implementation of the Proposed Action or its alternatives and have been prepared in accordance with 40 CFR 1502.16 and 14 CCR 15126. The analysis is formulated on the basis of available information, using reasonable projections of the possible consequences of the Proposed Action. For purposes of this document, an environmental impact is defined as a change in existing conditions that would be affected by the Proposed Action or alternatives. The effects can be "direct" (primary), which are caused by the project and occur at the same time and place, or indirect (secondary) which are caused by the project and are later in time or farther removed in distance, but are still reasonably foreseeable. The duration of the effect can be short-term (e.g., several years following project operations) or long-term (much longer than the operational life of the project). Anticipated effects are assessed quantitatively and/or qualitatively, ~~as appropriate~~.

2. Physical modifications to the project site would result in direct impacts, such as displacement of soils, vegetation and wildlife. Mine operations would result in both direct and indirect impacts. Increases in traffic on vicinity roads and extraction of ground water for project needs are examples of direct operational impacts. Examples of indirect operational impacts include effects of noise and human presence on wildlife habitat adjacent to the project site, habitat fragmentation, and potential effects to vegetation due to ground water withdrawal.

3. The assessment of the project's impacts to the environment considers the level of direct and indirect impacts that would occur with mitigation measures included by Canyon as part of the Proposed Action. These measures that are integral to the Proposed Action are referred to in this Draft EIS/EIR as "mitigation measures incorporated by project design." The level of impact after implementing these mitigation measures is referred to as the "residual impact."

4. Within this chapter, separate sections are provided for each environmental resource category (e.g., water resources, vegetation, wildlife) corresponding to the discussion of the existing environment in Chapter 3.0. Within each resource category discussion, potential direct and indirect impacts of project implementation are discussed. Mitigation measures incorporated by project design, and residual impacts considering these measures, are identified.

5. Because the proposed Briggs Project is in the preliminary design stage, the site plan layout, operational characteristics, and scale of major facilities are fairly well-defined. The evaluations in this chapter are based upon the current details of the project provided in Section 2.2.

6. It is typical of mining projects that final design modifications are made in response to additional exploration data, actual ore characteristics and quantities, processing experience, evolving mining technology and results of environmental analyses. For the Briggs Project, minor modification of the site configuration may also be desirable if land use restrictions associated with the surrounding WSAs are removed by the pending DPA. This chapter addresses the maximum anticipated range of environmental effects which may occur throughout the life of the project.

7. In addition to impacts of project implementation, as discussed in this chapter, assessment of overall effects to the environment requires consideration of other past, present and reasonably foreseeable actions. Assessment of these cumulative impacts, as required by NEPA and CEQA, is discussed in Chapter 5.0.

4.1.2 DEVELOPMENT OF SIGNIFICANCE CRITERIA

1. The significance of the anticipated impacts is assessed in this Draft EIS/EIR based upon criteria established for each environmental resource category. In many cases, criterion are derived from standards in regulations or guidelines such as the ESA, Clean Air Act, and the NHPA. The CEQA also provides guidance on effects that would normally be significant. The CEQ regulations provide guidance on significance at 40 CFR 1508.27.

2. Where no regulatory criterion are available, standards for determining significance have been developed in consultation with qualified individuals and/or with agencies responsible for the environmental resource. These standards are based upon acceptable change to the existing environment that would not result in a substantial detrimental effect considering:
   - Resource sensitivity (the probable response of a particular resource to project-related activities).
   - Resource quality (the present condition of the resource potentially affected).
   - Resource quantity (the amount of the resource potentially affected) and duration of impact (the period of time over which the resource would be affected).

   The significance criteria are stated at the beginning of each section for the topic and specific issues being evaluated.

4.1.3 DEVELOPMENT OF MITIGATION MEASURES

1. Measures to reduce or avoid the potential adverse environmental effects of the project have been identified through project reviews and scoping by the BLM and the County. Two types of mitigation measures are discussed in this EIS/EIR: (1) mitigation measures incorporated by project design; and (2) additional mitigation measures recommended by County and BLM staff. These mitigation measures are identified for each topic discussed in this chapter.

2. Most of the mitigation measures identified have been voluntarily incorporated by Canyon into the Proposed Action and are identified as such in this chapter. As discussed in Section 4.1.1, the effectiveness of these mitigation measures incorporated by project design is considered in the impact evaluation. Appendix F contains a preliminary Mitigation Monitoring Plan for these measures in accordance with CEQA.

~~2.~~ 3. As discussed in this chapter, mitigation measures incorporated by project design would not reduce all environmental impacts to a level that is less than significant. For environmental resources where significant residual impacts would occur, CEQA requires the lead agency to adopt practical mitigation measures to avoid or substantially lessen these impacts (14 CCR 15041 and 15091). In accordance with 40 CFR 1502.14(f) and 43 CFR 3809 regulations, BLM can also require a project proponent to implement mitigation not already included in the Proposed Action to prevent unnecessary or undue degradation of federal lands. Mitigation measures that are not a part of the Proposed Action, but are recommended to reduce residual impacts, are identified at the end of each appropriate environmental resource category discussion, and are summarized in Table 4.1.1.

~~3.~~4. For resource topics where residual impacts have been determined to be significant, the County would adopt those additional measures that can reduce or avoid such impacts if the project is approved, consistent with their responsibility as a CEQA lead agency. Reclamation plan approval would be conditioned upon implementation of those measures adopted by the County. BLM resource specialists have recommended adoption of the additional mitigation measures that they have determined necessary to avoid unnecessary or undue degradation of federal lands if the project is approved. Measures adopted by BLM would be ~~incorporated as conditions of approval of the Plan of Operations~~ committed as part of the ROD and implemented by BLM or other appropriate agencies in accordance with 40 CFR 1505.3.

TABLE 4.1.1

SUMMARY OF ADDITIONAL RECOMMENDED MITIGATION MEASURES[1]

RECOMMENDED MITIGATION	NEPA (40 CFR 1502.16[f]) MITIGATION MEASURE	CEQA MITIGATION MEASURE
Soils		
S-1. As part of onsite road reclamation, Canyon should: (1) perform soils analyses on representative portions of onsite road surfaces where revegetation is planned; and (2) remove road base material where accumulation of salts by road watering may hinder vegetation. Material removed from road surfaces should be deposited on the heap leach pad, prior to application of growth media to the heap.	YES	NO[2]
Vegetation		
V-1. As part of the reclamation plan, Canyon should: (1) salvage some of the native plants in areas to be disturbed; and (2) maintain these plants during operations in an onsite nursery, for transplanting into disturbed areas during final reclamation. Nursery activities should also include efforts to grow additional plants from cuttings and seeds obtained from vegetation in disturbed areas.	YES	YES[3]
V-2. During final reclamation, Canyon should disperse large rocks over the disturbed surfaces, to encourage biological productivity that may improve rate of vegetation reestablishment.	YES	YES[3]
Wildlife		
W-1. If burrowing owls are found at the nesting location near Ballarat Road when project construction is planned to start, or when borrow activities are scheduled to occur if the north borrow area is used, then: (1) use of the north borrow area should be avoided from March through August; and (2) signs should be posted along the portion of Ballarat Road adjacent to the location of the owls, specifying a reduced speed limit (e.g., 20 mph) and warning drivers to be alert for avian wildlife.	YES	YES
W-2. Canyon should perform habitat enhancement for the Townsend's big-eared bat. Habitat enhancement should be tiered based on the success of the planned bat relocation measures, as follows: • Canyon should provide a gate to preclude undesirable human access at the Gold Tooth adit located near the Briggs Project site. • If the relocation of the maternity colony of big-eared bats cannot be determined successful, Canyon should perform habitat enhancement at one or two additional adits in the vicinity. Enhancement of two additional adits should be required if gating of the Gold Tooth adit does not improve habitat at that location, as indicated by level of use by this species.	YES	YES
W-3 The fence proposed for the processing area should have a minimum height of 8 feet and should encompass all cyanide storage and use areas to effectively discourage access by bighorn sheep. Fencing material should be chain-link, or another material acceptable to BLM, with gates where human access is required. Gates should be kept closed when not in use.	YES	NO[2]

(1) These mitigation measures are recommended for implementation pursuant to 40 CFR 1502.16(f) and 14 CCR 15041, in addition to mitigation measures incorporated by project design. These additional recommended mitigation measures and their anticipated effectiveness are discussed in detail in respective resource category sections of Chapter 4.0.

(2) This recommended mitigation measure would not mitigate a significant impact. Therefore, CEQA does not provide authority for its implementation.

(3) Impacts of the Proposed Action to vegetation would not be significant and, therefore, CEQA does not provide the authority for the County to impose these measures for mitigation of vegetation impacts. However, the County can require these measures to mitigate significant visual impacts, because some of this impact would be due to the lack of vegetation on disturbed surfaces.

TABLE 4.1.1

SUMMARY OF ADDITIONAL RECOMMENDED MITIGATION MEASURES[1]
(Continued)

RECOMMENDED MITIGATION	NEPA (40 CFR 1502.16[f]) MITIGATION MEASURE	CEQA MITIGATION MEASURE
Air Quality		
A-1. To reduce PM_{10} concentrations at points of potential public exposure, waste rock disposal locations should be controlled during high speed winds (i.e., greater than 20 mph) so that dumping occurs at locations that are the farthest upwind from points of potential public exposure. To allow enforcement of this measure, Canyon should maintain a continuous wind speed monitoring station and records of waste rock disposal locations at times of high wind.	YES	YES
A-2. To provide additional control of offsite emissions, Canyon should treat and maintain the access road with an emulsion compound capable of 90 percent dust emission control.	YES	YES
A-3. Canyon should implement a monitoring program to assure that the clay borrow contains adequate moisture to prevent excessive dust. Canyon should submit a detailed plan for moisture monitoring (i.e., sample method, frequency, etc.) prior to each phase of borrow. If the moisture of the clay material being excavated or hauled drops below 4 percent, excavation should be halted during periods of high speed winds and, when excavation and hauling does occur, each load should be covered (e.g., tarped) or wetted prior to transport.	YES	YES
Visual Resources		
Mitigation measures V-1, V-2 and A-2 are recommended to reduce significant visual impacts.	YES	YES
Transportation		
T-1. Canyon should inform vendors with large deliveries of the potentially hazardous conditions at the Slate Range crossing. Service contracts or other written statements should warn vendors of the steep grade, sharp corners, reduced speeds required for safe travel, and the need for large trucks to be equipped with a "Jacobs-break." A map of the site vicinity and clear directions should also be provided in writing to assist drivers in finding the site, and to designate areas where large vehicles need to exercise special caution.	NO[4]	YES
Mitigation measure A-2 is recommended to reduce the traffic hazard of decreased visibility on Ballarat and Wingate roads.	YES[5]	YES

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(1) These mitigation measures are recommended for implementation pursuant to 40 CFR 1502.16(f) and 14 CCR 15041, in addition to mitigation measures incorporated by project design. These additional recommended mitigation measures and their anticipated effectiveness are discussed in detail in respective resource category sections of Chapter 4.0.

(2) This recommended mitigation measure would not mitigate a significant impact. Therefore, CEQA does not provide authority for its implementation.

(3) Impacts of the Proposed Action to vegetation would not be significant and, therefore, CEQA does not provide the authority for the County to impose these measures for mitigation of vegetation impacts. However, the County can require these measures to mitigate significant visual impacts, because some of this impact would be due to the lack of vegetation on disturbed surfaces.

(4) This ~~recommended~~ mitigation measure ~~would not be required~~ is not recommended to prevent unnecessary or undue degradation of federal lands. Therefore, ~~BLM~~ NEPA regulations do not provide authority for its implementation.

(5) Impacts of the Proposed Action to transportation would not constitute unnecessary or undue degradation under 43 CFR 3809. However, BLM staff can ~~require~~ recommend this mitigation measure to reduce impacts to air quality.

4.1.4 CHAPTER ORGANIZATION

1. This chapter evaluates potential environmental impacts of the Proposed Action and alternatives in the following sections:

- 4.2 - Topography, Geology and Soils
- 4.3 - Water Resources
- 4.4 - Vegetation
- 4.5 - Wildlife
- 4.6 - Air Quality
- 4.7 - Land Use, Recreation and Wilderness
- 4.8 - Visual Resources
- 4.9 - Cultural Resources
- 4.10 - Transportation
- 4.11 - Noise
- 4.12 - Socioeconomics
- 4.13 - Environmental Health and Safety
- 4.14 - Evaluation of Alternatives

4.2 TOPOGRAPHY, GEOLOGY AND SOILS

4.2.1 PROPOSED ACTION

4.2.1.1 Topography

1. Modifications to site topography that would occur as a result of the Proposed Action are discussed in this section. Both short-term and long-term changes are considered. The topographic modifications discussed herein directly affect other resources including aesthetics, land use and surface water drainage. These associated effects are addressed in subsequent sections. Topographic effects, in and of themselves, would be considered significant if the project would result in surface relief or slopes that are substantially unlike existing topography of the area.

2. During mine construction and operation, natural ground contours would be modified by the construction of drainage controls, site roads, building pads (e.g., for the administration and shop buildings), solution ponds, growth media stockpiles, waste rock piles, mine pit, leach pad and other site facilities. Most of these topographic disturbances would be relatively minor and regrading would occur during reclamation to make disturbances conform to the surrounding area. Topographic disturbances that would be regraded include: site roads, building pads, process ponds, and growth media stockpiles. The primary topographic disturbances that would remain following reclamation are those changes due to the mine pit, leach pad and waste rock piles.

3. The mine pit would be about 220 feet deep at the low point of the pit rim. The maximum height of the high wall would be about 1,100 feet. Overall slopes could be up to about 60 degrees where allowed by rock strength and structure properties (see Section 2.2.2.2.2). The mine pit would occur at the mouth of Redlands Canyon. The apex of the alluvial fan and the vertical drop on the floor of the canyon known as Manly Fall (Figure 3.2.3) would become part of the mine pit excavation. The pit topography would not be notably modified during reclamation.

4. The north and south waste rock dumps would be about 460 and 440 feet high, respectively, measured vertically from the toe to the top. Benches would be provided at about 100 to 200 foot intervals. The overall slope would be about 2.5H:1V. The interbench slope is expected to be about 1.5H:1V (about 34 degrees). As discussed in Section 2.2.2.2.3, this expected interbench angle would be less than the natural angle of repose due to the dynamic forces (momentum) of the large rock material as it is placed by the end-dump method. The natural friction strength of broken rock is about 45 to 50 degrees. This would provide inherent stability to the interbench slopes precluding the potential for frequent or substantial raveling for static (i.e., non-earthquake) conditions. During final site operations and/or

reclamation, the waste rock piles would be graded to break up the straight line man-made appearance. Also, surficial modifications such as provision of microcatchment areas and berming of the waste rock pile edges would occur to provide runoff control and encourage vegetation establishment (see Section 2.2.3.4.1).

5. The heap leach pile would be up to 150 feet high. The top would be relatively flat and may be stepped, as necessary, to provide a relatively uniform thickness above the natural sloped topography. The slopes of the leach pile would be constructed with benches to provide stability. The overall slope during operations would be about 2.5H:1V. The interbench slope is expected to be about 1.3H:1V (i.e., about 37 degrees). This is approximately the natural angle of repose for the planned crushing size. The interbench slope would not be substantially less than the angle of repose as it would be for the waste rock piles because the small particle size of the crushed ore and different placement method (i.e., conveyor versus end dumping) results in less dynamic energy (momentum) to reduce the slope angle. During reclamation, the heap leach slopes would be regraded to blend the benches and slopes and provide an overall slope angle of 3H:1V.

6. If the onsite borrow area is used, it would be completed in a condition such that free-surface drainage is provided and slopes are 5H:1V or less. Where necessary to attain these conditions, the area would be backfilled with waste rock from the mine pit. If one of the two potential borrow locations on the playa is used instead, the postreclamation configuration would consist of a shallow depression (i.e., about 4 feet deep) with slopes of 5H:1V or less.

7. Regrading of site disturbances such as roads, building pads, ponds, etc., would make long-term effects of these features minimal. The mine pit, waste rock piles and leach pad would change ground surface contours up to hundreds of vertical feet. Although the mine pit and piles would be relatively large on a local scale, they would not result in steeper slopes or vertical relief that would be unlike land surface forms naturally occurring in the area. Topographic effects of the project, therefore, are not considered to be significant.

4.2.1.2 Geology

1. Environmental impacts related to geology are primarily potential geologic hazards which could impact project facilities. The following potential hazards have been identified and are discussed in this section:
   - Potential for surface rupture due to the active faults that traverse the site.
   - Ground shaking due to seismic activity in the site region.

These potential hazards would be considered significant if project facilities and operations could not be designed to withstand reasonably foreseeable seismic activity with minimal potential for damage that could substantively impact public health, safety or environmental resources.

4.2.1.2.1 Surface Rupture Potential

1. As discussed in Section 3.2.2.3, Alquist-Priolo Special Studies Zones traverse the project site, and consequently, a detailed study of the potential for surface rupture was conducted (Cleary, 1993). As required by the Alquist-Priolo Special Studies Zones Act, active faults (movement within the last 10,000 years) within the project site, were defined and mapped (see Figure 3.2.7).

2. The Alquist-Priolo Act requires that structures intended for human occupancy (defined as being inhabited for 2,000 or more hours per year) be set back from active faults at least 50 feet. This setback is intended to preclude structural damage that could occur as a direct result of surface offset of known fault traces. This minimum setback requirement would be observed for all nonprocess project facilities intended for human occupancy (e.g., administration and shop buildings, etc.).

3. The CCR Chapter 15, Article 7, which regulates heap leaching operations, requires that heap leach pads not be located on active faults. To provide a conservative setback, the heap leach pad, solution ponds, and other process facilities have been designed at a minimum of 100 feet from the active fault traces identified and located during the site study. This setback exceeds CCR Chapter 15, Article 7 siting requirements for facilities of this type and would mitigate the potential for damage due to potential surface rupture at the known fault traces. The 100-foot setback also exceeds siting requirements for habitable structures.

4. Although not planned at this time, some project facilities, for example, a water supply pipeline and power line to the wells, may have to cross the main active fault trace that lies west of the leach pad. If this condition occurs, the facilities would be designed to mitigate the potential for damage in the unlikely event of surface offset during the short operational period of the Briggs Project. Valves, automatic pump shutoffs or other hardware would be provided for the water pipeline so that flow could be shut down if the pipe were to break. Process facilities and process solution piping would not cross the fault trace.

5. Older fault traces traverse the foot of the mountains where the waste rock piles and mine pit would be located. While these faults were determined by the detailed site study to have moved during Quaternary time (up to 1.6 Ma), published references and the tectonic framework of the region suggest that more recent movement has shifted to the fault traces west of the heap leach pad. Even if movement were to occur on this older "range front" set of fault traces, primary effects would be sloughing of waste rock pile and mine pit slopes. There would be no structures or processing facilities in these areas to sustain damage due to surface rupture.

6. The setbacks for human occupancy structures and process facilities, and other preventative measures discussed are consistent with good engineering practices. These measures are considered to mitigate, to a level that is less than significant, the potential for reasonably foreseeable seismic activity to threaten public health, safety, or environmental resources.

4.2.1.2.2 Ground Shaking

1. Ground shaking at the site could occur due to seismic activity at local or regional faults discussed in Section 3.2.2. Accelerations due to ground shaking have the potential to affect project buildings, structures and slopes.

2. Design of buildings and structures in a manner that minimizes the potential for damage due to ground shaking is regulated by the UBC. The UBC designates the site vicinity to be within Seismic Zone 4 recognizing that strong ground motion and associated relatively high acceleration are possible, based on the known tectonic framework of the region. Project buildings and structures would be designed and constructed in conformance with Seismic Zone 4 standards, which are the strictest standards designated by the UBC. With adherence to these standards, and removal of buildings and structures at the completion of the project, this aspect of the operation would not pose a significant risk to human health, safety or environmental resources.

3. Slope stability analyses have been performed for the preliminary slope designs for the project site including:

   - Waste rock slopes.
   - Heap leach slopes.
   - Mine pit slopes.

   The studies show that these slopes can be constructed to be stable against ground shaking as discussed in the following paragraphs.

4. Slope stability is commonly described in terms of the "factor of safety" against slope movement. The factor of safety is a ratio of the factors responsible for slope stability (e.g., intergranular cohesion and friction) to the factors responsible for slope movement (e.g., gravity and acceleration due to seismic activity). The factor of safety is calculated by pseudo-static analysis. A factor of safety of greater than 1.0 indicates that the stability forces are greater than the forces responsible for slope movement and, therefore, movement should not occur. A factor of safety of 1.0 indicates that these forces are equal.

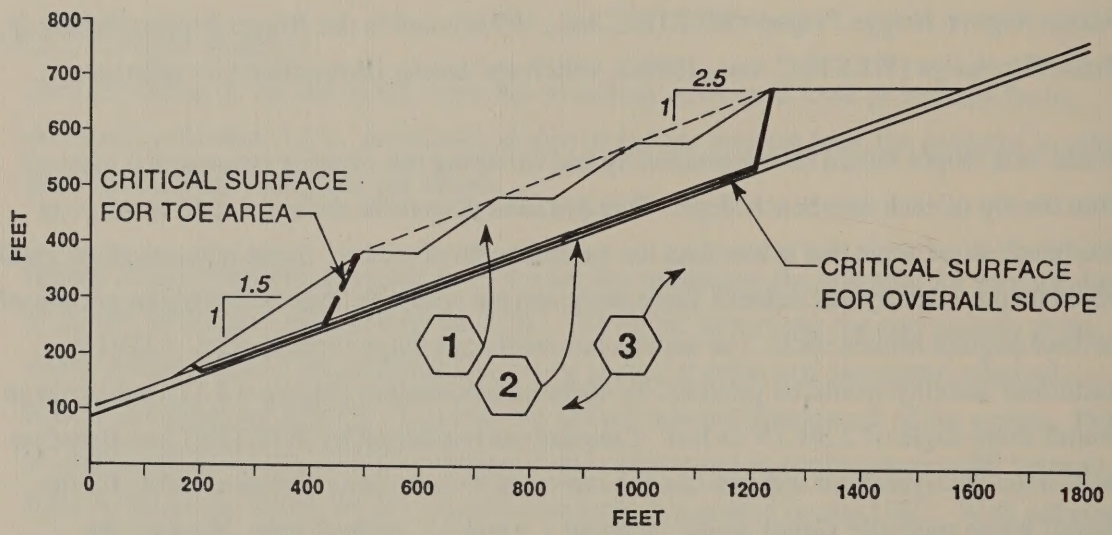
5. Generally accepted published literature (Seed, 1979) establishes that a maximum acceleration of 0.15g is adequate for worst-case pseudo-static modeling, even if higher accelerations are possible for the subject site. The maximum 0.15g acceleration was utilized for modeling of slope stability for the Briggs Project site. A detailed presentation of the modeling and the results discussed in the following paragraphs is provided in a report titled *Feasibility Level Design Report, Briggs Project* (WESTEC, Inc., 1993a), and in the *Briggs Project Report of Waste Discharge* (WESTEC, Inc., 1993c), which are hereby incorporated by reference.

6. Waste rock slopes would be constructed by end-dumping run-of-mine (uncrushed) material from the top of each interbench slope. This dynamic placement method would result in an interbench slope angle that is less than the natural angle of repose. Some inherent slope stability would be provided by this reduced slope angle and the relatively high intergranular friction of the hard angular broken rock. The anticipated interbench slope angle is about 1.5H:1V. Additional stability would be provided by constructing benches (Figure 4.2.1) resulting in an overall slope angle of 2.5H:1V or less. Calculations conducted by WESTEC, Inc. based on these slope configurations indicate that the static and pseudo-static factors of safety for the overall waste rock pile slopes would be about 1.5 and 1.1, respectively. Because the calculated pseudo-static factor of safety for the waste rock piles is close to 1.0, a deformation analysis was also performed (Environmental Solutions, Inc., 1994) to determine if any movement of the slopes would be expected in the event of a large earthquake. The deformation analysis was performed using the Newmark Sliding Block Analysis method. Material parameters (e.g., friction angle, etc.) were taken from the WESTEC, Inc. reports. Results of this analysis indicate that the greatest potential for slope movement occurs near the toe of the slope. At this location, a static factor of safety of 1.2 was calculated. The deformation analysis concluded that if the MCE discussed in Section 3.2.2.3 were to occur on the Panamint Valley Fault (0.59g peak ground acceleration at the project site) the amount of slope displacement expected would be about 2 feet. This small potential slope displacement would not pose a significant hazard to public health and safety or the environment.

MATERIAL		DENSITY (pcf)[1]	FRICTION ANGLE (degrees)	COHESION (psf)[2]
SYMBOL	DESCRIPTION			
1	WASTE ROCK	125	38	0
2	ALLUVIUM	125	32	0
3	BEDROCK	125	38	500

(1) POUNDS PER CUBIC FOOT
(2) POUNDS PER SQUARE FOOT

SEISMIC ACCELERATION	FACTOR OF SAFETY
0.0	1.5 (SEE NOTE)
0.15	1.1



NOTE:
INDICATED FACTOR OF SAFETY IS FOR THE OVERALL SLOPE AS CALCULATED BY WESTEC, INC. (1993c). THE STATIC FACTOR OF SAFETY FOR THE TOE AREA CRITICAL SURFACE IS CALCALATED TO BE 1.2 (ENVIRONMENTAL SOLUTIONS, INC., 1994).

SOURCE: ADAPTED FROM WESTEC, INC., 1993c.

FIGURE 4.2.1

WASTE ROCK DUMP SLOPE STABILITY MODEL

BRIGGS PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

7. The heap leach piles were evaluated for stability based on preliminary liner and pad configuration designs. The heap leach pad will be constructed by end-dumping and/or stacking via conveyor from the top of the slope of each lift. The interbench slope angle is expected to be about 1.3H:1V. Benches will be provided to result in an overall slope of 2.5H:1V around the pile perimeter. Slopes would be regraded to an overall angle of 3H:1V during reclamation.

8. With regard to slope stability, the worst-case leach pile edge configuration would be for west-facing pile slopes because the natural grade is adverse to stability, sloping outward from the pile toe. The preliminary heap leach pad design includes modifying the natural slope at this location, providing an approximately 100-foot wide "key" along the western heap leach pad edge that would reduce the outward slope to about 2 percent. Figure 4.2.2 illustrates the slope stability model evaluated for this configuration. Leach pile slope stability modeling was performed for the 2.5H:1V slope configuration that would occur during operations. The static and pseudostatic factors of safety are 1.8 and 1.2, respectively, indicating stability. The post-reclamation 3H:1V slope would be even more stable. The 3H:1V slope is calculated to have static and pseudostatic factors of safety of 2.2 and 1.4, respectively (WESTEC, Inc., 1993a).

9. A fundamental difference in engineering of mine pit slopes, as compared to waste rock and heap leach slopes, is that final mine pit slopes are engineered based on knowledge of rock strength and structure properties gained during mine operations when the rock becomes exposed in the mine pit and can be studied in detail. This is necessary because the structural features (e.g., joints, fractures and faults) are generally the controlling factors for mine pit wall stability. The frequency and strength properties of these structural features, as well as their specific locations and orientations with respect to the final pit walls, must be considered in slope stability analyses. This is different from waste rock and heap leach pile slopes where engineering for stability can be completed prior to operations based on anticipated particle size and other physical characteristics of the broken rock.

10. Mine pit slopes would primarily be composed of two different types of rock. The predominant rock type would be the gneiss that is the mineralized host rock. The second type rock unit is the granitic rock that occurs above the detachment fault (see Section 3.2.2.2). The granitic rock is highly weathered and fractured, and would occur in some portions of the upper mine pit slopes. The gneiss that comprises the majority of the mine pit area is the more competent of the two rock types and, therefore, can be excavated at a steeper angle. The overall slopes of both rock units within the pit would be divided by benches generally 15 to 20 feet wide and

MATERIAL		DENSITY (pcf)[1]	FRICTION ANGLE (degrees)	COHESION (psf)[2]
SYMBOL	DESCRIPTION			
1	ORE	100	37	0
2	LINER/ORE & LINER/SOIL	120	25	0
3	STRUCTURAL FILL	125	32	0
4	ALLUVIUM	125	32	0

[1] POUNDS PER CUBIC FOOT
[2] POUNDS PER SQUARE FOOT

FAILURE TYPE	SEISMIC ACCELERATION	FACTOR OF SAFETY
WEDGE	0.0 0.15	1.8 1.2
CIRCULAR	0.0 0.15	1.9 1.3

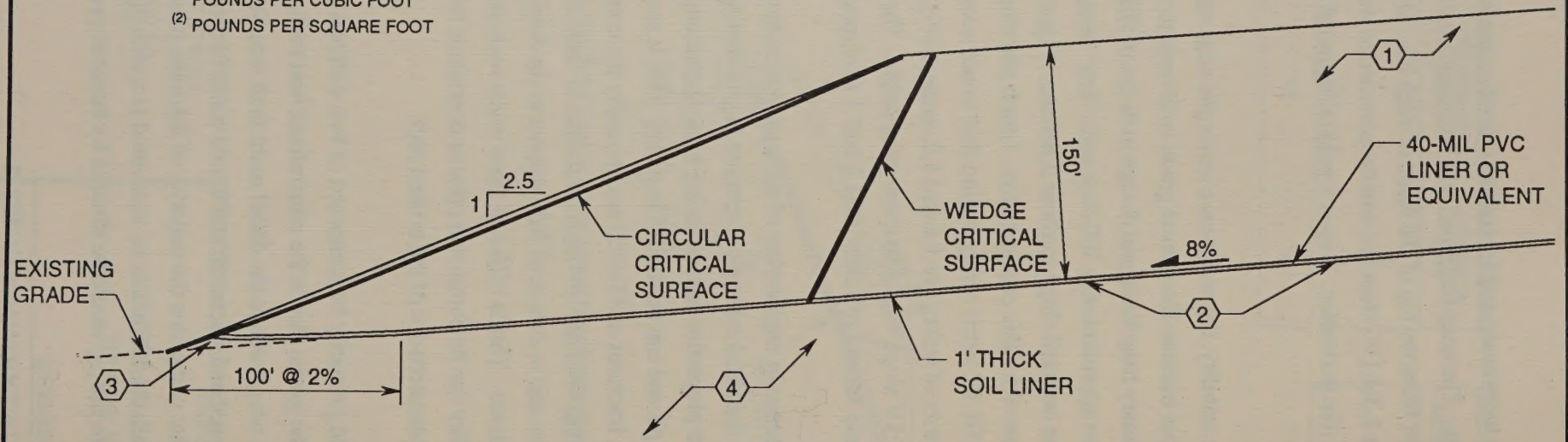


FIGURE 4.2.2

WESTERN LEACH PILE SLOPE STABILITY MODEL

BRIGGS PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

SOURCE: WESTEC, INC., 1993c.

interspersed at vertical intervals of 40 to 60 feet to mitigate excessive raveling of loose rock and limited sliding of the mine pit slopes that might occur. Maximum interbench intervals of 100 feet could be used at some locations with a wider bench width (e.g., 25 feet or more).

11. Detailed geologic mapping of the mine pit would be conducted throughout operations. Final slopes for various areas of the mine pit would be designed as part of ongoing mine planning, incorporating knowledge of rock structures and strength gained through exposures within the mine pit. Preliminary engineering indicates that the gneiss that comprises most of the mine pit could be excavated at relatively steep angles (e.g., about 60 degrees) at locations where the orientation of structures is not adverse to pit wall stability. Based on preliminary engineering, the upper granitic unit, which is less competent due to the high degree of weathering and fracturing, would need to be excavated at less steep slopes (e.g., about 45 degrees). Steeper slopes may occur if determined to be stable by final engineering.

12. The stability analyses performed for the project are anticipated to reasonably reflect slope stability conditions for most earthquakes that may occur in the region. However, because of the tectonic framework of the region and the presence of the Panamint Valley Fault Zone traversing the project site, it is likely that over the very long term there will be occasional earthquakes that would cause a higher degree of ground shaking that is simulated by the pseudo-static analyses performed. Published literature and studies conducted specifically for the Briggs Project indicate that the recurrence interval for substantial seismic events (e.g., greater than 1 meter of offset) on the Panamint Valley Fault Zone is between about 500 and 2,000 years (Cleary, 1993). As discussed in Section 3.2.2.4, the MPE for the Panamint Valley Fault Zone in the project vicinity is calculated to be a M6.7 earthquake with repeated ground accelerations of about 0.34g. Events of this magnitude occurring in the immediate vicinity of the project may result in movement of steeper slopes.

13. The probability of a large event occurring in the project vicinity within the operational period of the mine is very small. Although some raveling could be expected to occur over the long-term as a result of occasional seismic events, it would not pose a substantive threat to human health, safety or the environment due to the remote site location and similar natural conditions (i.e., steep slopes) of the site area. Therefore this impact would not be significant.

14. Potential secondary effects of a nearby earthquake include liquefaction, induced flooding, subsidence and landsliding. The depth to ground water beneath the site and well-graded texture of alluvial deposits precludes the possibility of onsite liquefaction. The site is high and

far enough from the coast or large inland body of water to preclude the hazards of a tsunami, seiche or inundation from the rupture of an upgradient reservoir. The solution ponds are designed so that the barren and pregnant ponds are within the freeboard of the emergency containment pond (see Figure 2.7). The normal operating solution levels will be more than 15 feet below the top of the liner and the ponds will be covered. Therefore, splashing of processing solution out of the ponds during a seismic event is unlikely.

4.2.1.2.3 Risk of Unknown Fault Splays

1. The potential for occurrence of an unknown splay fault under a key project facility has been considered to evaluate whether this potential would represent a significant threat to the environment. This section evaluates the implications of the potential for occurrence of such a splay fault, and concludes that it is not a significant issue. The reasons for this are as follows:
   - The potential for occurrence of such a splay fault is considered to be speculative.
   - The potential that such a splay fault could move during the relatively short life span of the project is remote.
   - The potential risks of severe environmental damage, even if such a splay were to exist and rupture, are low.

2. The potential for the existence of a splay fault under any of the key project features such as the heap leach pad or process water ponds is considered speculative because of the detailed fault investigation work that has been completed and the project design precautions that have been taken. As discussed in Section 3.2.2, the Briggs Project site has been mapped in detail for active faults including the associated splay faults. The tectonic regime of the site is well understood and the active faults are well defined in the field and on aerial photographs. As discussed in Section 4.2.1.2.1, setbacks have been provided between the fault traces and the major project facilities.

3. Furthermore, even if such a splay were to exist, the likelihood of movement along it over the relatively short life of the Briggs Project is extremely low, and not reasonably foreseeable. As discussed in Section 4.2.1.2.2, the recurrence interval for large earthquakes along the Panamint Valley Fault Zone is expected to be between about 500 and 2,000 years. This means that the probability of a large earthquake occurring during the anticipated six-year project operating life is about a few tenths of a percent to about 1 percent. Combined with the low likelihood of an unknown fault splay to occur, the probability of a fault splay having offset is much lower, because a splay fault would not necessarily move concurrent with a main fault trace.

4. In the unlikely event that a fault splay were to exist and rupture beneath the heap leach pile during operations, there is a potential that containment systems could be damaged allowing processing solution to escape into the vadose zone. Some or all of this solution would be adsorbed by the surficial desert soils and the underlying alluvium above the water table. For this hypothetical release scenario, depending on the extent of the release, it may be possible for some solution to reach ground water. Substantial reduction in cyanide concentration of the released solution would occur before the solution could ever reach ground water due to attenuation resulting from adsorption, complexing, volatilization and other chemical and physical processes.

5. In the event of a major earthquake during project operations, Canyon would immediately assess leach pile and pond containment integrity and implement corrective measures, if necessary. An Earthquake Emergency Response Plan would be submitted for BLM and County approval prior to the introduction of cyanide to the processing circuit. Example measures that could be implemented if solution were to escape include adding cyanide destructing compounds directly to the affected areas, or to the processing circuit. If measurable amounts of cyanide were to reach the ground water table, the concentration would be low (due to the dilute nature of the processing solution and attenuation in the vadose zone) and additional dilution and attenuation would occur as the seepage mixes with ground water. Any ground water that could be affected is not suitable for drinking or irrigation without treatment because of the high TDS concentration. The ultimate fate would be natural degradation or storage in ground water beneath the playa which has a TDS of up to a few hundred thousand parts per million (nearly eight times higher than sea water). ~~and consequently, no beneficial uses.~~

6. The Proposed Action is not designed to produce the potential impacts discussed in this section, and these potential impacts are not implied to be approved as part of issuance of permits by BLM, the County or other agencies.

4.2.1.3 Soils

1. Potential environmental consequences of the Proposed Action on soils are reviewed in this section. The primary consideration for impacts to soils is the loss of soil due to surface disturbances. Effects to soil would be considered significant if substantial quantities of good quality topsoil would be lost due to Briggs Project site development.

2. Soils adequate for use as growth media would be salvaged from areas to be disturbed as required by the proposed reclamation plan (Section 2.2.3). A total of approximately 470 acres of new disturbance would occur as a result of project implementation (about 35 acres are currently disturbed). Approximately 760,000 cubic yards of soil are expected to be salvaged, or 680,000 cubic yards if one of the playa borrow locations is used instead of the onsite borrow location. Soils would be spread over disturbed areas for use as growth media as a part of reclamation. If one of the playa borrow locations is used, it would not be covered with growth media because the playa surface is naturally alkaline and bare of vegetation.

3. Soils would not be removed until disturbance of an area is required for mining or associated facilities. In areas where disturbance would be minimal, for example, the water production well field, soils would be left in place because reclamation would occur promptly following the initial disturbance. Soil salvage and use would occur in a manner that would minimize the amount stored for an extended period of time, and measures would be taken to maximize biological values of the stored material.

4. Practical limitations of soil salvage operations would result in some soil not being salvaged. Additionally, some soil would have to be stored for up to several years which could substantially reduce its biological values. Because these soils are naturally rocky and nutrient-poor, the mitigated loss would not represent substantial soil values and, therefore, this impact would not be significant.

5. Due to the coarse nature of the soils present onsite, substantial soil loss by wind or water erosion is not anticipated. There is a naturally high sediment load during the infrequent occurrences of surface water flow over the alluvial fan because of the steep gradient and low cohesion of the alluvial material. The braided wash network transports a large amount of sediment, and individual channels naturally migrate over the fan surface over time to distribute sediments carried from upland areas. Erosion and sediment transport is further addressed in Section 4.3.

6. As discussed in Section 3.3, ground water in the site area has a high concentration of dissolved solids. Use of this water for dust control could result in salt accumulation in soils over time on roads that are in place for a substantial portion of the project (i.e., haul and access roads that are outside the boundaries of the mine pit and waste rock piles). Surfactants would be used on project roads to reduce the frequency of water spraying. Some surfactants

are also salt compounds. The impact to soils due to salts from road watering would not be significant because:

- Soils that are suitable for growth media would be salvaged during road construction and stockpiled for use during reclamation. The soils that could be impacted, therefore, would be limited to subsurface horizons and soils that are of poor quality.
- Soils at the site naturally have a high salt content.

4.2.2 ALTERNATIVES

4.2.2.1 Topography

4.2.2.1.1 No Action Alternative

1. Under the No Action Alternative, the project would not be implemented and related topographic modifications would not occur. Existing exploration disturbances related to Canyon activities would be reclaimed. There would be no substantive changes to the natural site topography.

4.2.2.1.2 Alternative Ore Beneficiation Rates

1. Alternative ore beneficiation rates would not change project effects to topography. The same disturbances would occur, however, slightly faster or slower than for the Proposed Action.

4.2.2.1.3 Reduced Project Size

1. The reduced project size alternative would reduce the total tons of ore and waste rock to be mined by approximately 30 percent. There would be a corresponding decrease in waste rock, heap leach pile, and mine pit volumes.

2. Overall engineering aspects of the mine pit, and waste rock and heap leach piles, would be the same as for the Proposed Action. There would be no material changes to slope angles, etc. However, the mine pit would be slightly less deep and the mine pit highwall would be lower. The southern waste rock pile would still be built to its full configuration because it is a shorter haul distance than the northern waste rock pile. The northern waste rock pile would be reduced to about 55 percent of its planned capacity. Its eastern boundary would be approximately maintained so that haul distances are optimized. Its western boundary would be moved up the alluvial fan resulting in an estimated 10 to 15 percent reduction in height. The heap leach pile would still be constructed to a height of up to 150 feet, but its areal extent would be about 30 percent smaller. The excavation for borrow area for liner construction would also be 30 percent smaller.

3. Short-term topographic changes including grading for process ponds, building pads, haul roads, and other site facilities would be slightly less, but not notably different than for the Proposed Action.

4.2.2.1.4 Balanced Waste Rock Piles

1. The balanced waste rock piles would slightly modify the site topography as compared to the Proposed Action. The waste rock piles would be reconfigured, with the north waste rock pile being about 50 percent smaller in volume and about 80 feet lower measured vertically from toe to crest (Table 2.12). In addition, the toe of the waste rock pile would be moved eastward (Figure 2.25) as compared to the Proposed Action, and would more closely mimic the natural topography of the mountain flank.

2. The southern waste rock pile would be about 120 feet higher as compared to the Proposed Action. The volume would be increased about 110 percent by the increased height and expanding the dump southward along the mountain flank.

3. The mine pit, heap leach pile, borrow area and other site features affecting topography would be the same as for the Proposed Action.

4.2.2.1.5 Partial Backfilling

1. During mine operations, topographic changes to most of the site would be the same as for the Proposed Action. The mine pit, south waste rock pile, heap leach pad, and site infrastructure would still be built to their full configuration during mining. There would be an increase in the topographic change of the north waste rock pile, which would be about 300 feet higher than for the Proposed Action during operations.

2. After mining, the partial backfilling alternative would reduce the long-term topographic changes of the mine pit and waste rock piles. About 25 percent of the material excavated from the mine pit would be backfilled. The backfill material would be obtained from the north and south waste rock piles. Long-term topographic changes of the heap leach pile, site roads, and building pads, borrow area and site drainage facilities would be the same as for the Proposed Action.

3. With the partial backfilling alternative, the mine pit would not form a closed depression after reclamation. The mine pit area would consist of an approximately 50-acre backfill surface with a steepness similar to the upper reaches of the alluvial fan, contiguous with an approximate

700-foot pit highwall that would encompass the majority of the mine pit footprint (Figure 2.28). Under the Proposed Action, the closed depression of the mine pit would be filled in naturally over time by sediments from Redlands Canyon. As discussed in Section 3.3.2.2, this would be expected to occur within a period of a couple of decades to about 100 years. Under the partial backfilling alternative, there would be no difference in the configuration of the pit highwall (i.e., slope angle, benching) except for the lowermost portion being buried.

4. With partial backfilling, the south waste rock pile would be removed during reclamation to a height of about 100 feet. The north waste rock pile would remain about 325 feet high. The long-term benching and slope configuration, slope angle and orientation, etc., would be similar to that of the Proposed Action.

4.2.2.2 Geology

1. With the exception of the No Action Alternative, potential impacts due to fault rupture or ground shaking for each of the alternatives would be similar to the Proposed Action. For the No Action Alternative, the project would not be implemented and there would be no project facilities to be impacted.

2. The partial backfilling alternative could limit scientific opportunities for geologic study of exposures in the mine pit when mining is completed. Along with information regarding mineralization of ore bodies that is typically available from exposures in historic mining areas, the Briggs mine pit is likely to result in unique opportunities for scientific studies. The long geologic history contained in the Precambrian rocks and the extensive exposures of Quaternary faulting expected to occur are aspects of the mine pit that may be unique to this site and of particular interest. While the mine pit highwall would allow some opportunity to study the geologic aspects of the pit even with backfilling, the orientation of the highwall subparallels key geologic structures in the vicinity, so many structures may not be exposed in the highwall. It is likely that unique opportunities for scientific study, otherwise available until the pit naturally fills with sediment, could be lost for the long term if partial backfilling occurs.

4.2.2.3 Soils

4.2.2.3.1 No Action Alternative

1. For the No Action Alternative, the project would not be implemented. No project-related disturbances to soils would occur. Existing surface disturbances related to Canyon activities would be reclaimed.

4.2.2.3.2 Alternative Ore Beneficiation Rates

1. Alternative ore beneficiation rates would not substantively change project impacts to soils, but there would be minor differences in impacts. The same soil disturbances would occur, however, slightly faster or slower than for the Proposed Action. The same soil salvage measures would be implemented.

2. For the faster processing alternative, operations would last about four years instead of six. This could reduce the amount of time that some growth media is stored, reducing impacts on biological potency. Conversely, slower processing would require soils to be stored for a longer period of time, resulting in a slightly increased potential for impacts to biological potency.

4.2.2.3.3 Reduced Project Size

1. Reducing the amount of ore and waste rock to be mined by 30 percent would reduce project surface disturbances by an estimated 20 percent as compared to the Proposed Action. With the decreased disturbance, there would be a comparable decrease in soils disturbed.

4.2.2.3.4 Balanced Waste Rock Piles

1. The balanced waste rock pile configuration would result in the same amount of surface disturbance as the Proposed Action. The areas where disturbance would occur under this alternative generally have poorer soils than areas that would be disturbed for the Proposed Action (more disturbance would occur to soil units H, L, and O). The modified configuration of the north waste rock pile would result in a considerable reduction in disturbance to soil units G and E (see Section 3.2.3), which have some of the thickest surficial veneers that are adequate for salvage as growth media. This would result in a reduction of about 6 percent (about 45,000 cubic yards) of material salvaged for use as growth media. This small reduction is well within the accuracy of salvage estimates and, therefore, would not effect plans for reclamation.

2. Overall, the impact to soils would be slightly reduced as compared to the Proposed Action because of the lower quality soils that would be disturbed, but the difference would be small.

4.2.2.3.5 Partial Backfilling

1. For the partial backfilling alternative, the modified north waste rock pile configuration would increase surface disturbance by about 20 acres on the east side, where steep rocky slopes

occur (Figure 2.27). Soil would not be salvageable in this area. On the west side of the north waste rock pile, the modified configuration would reduce disturbance by about 7 acres within soil unit E, as compared to the Proposed Action. This would result in a slight (about 2 percent) reduction in the estimated volume of soil to be salvaged. Overall, the additional net increase in surface disturbance with a reduction in salvageable soil is considered a minor increased impact to soil resources.

2. Under the partial backfilling alternative, some of the stockpiled growth media would be stored for two-years longer while backfilling occurs. This would slightly increase the impact to soils, but would only affect a portion of the growth media stored. The schedule for growth media application to the heap leach pad, process water ponds, borrow area, and most site roads and ancillary facilities would not be affected.

4.2.3 REGULATORY REQUIREMENTS THAT LIMIT PROJECT IMPACTS

1. Construction of buildings and structures would occur in accordance with the UBC and applicable County ordinances. The County building department is responsible for reviewing building and grading plans to assure compliance with these requirements. The County is also responsible for assuring compliance with the Alquist-Priolo Act. The growth media salvaging plan, reclamation plan, and proposed final mine pit and pile slope conditions would be in accordance with SMARA requirements implemented through the County as the lead agency for SMARA compliance.

2. The Briggs Project would be regulated by BLM in accordance with 43 CFR 3809 requirements prohibiting unnecessary or undue degradation of federal lands. BLM would apply these standards to all aspects of project implementation, including salvaging of soils for use as growth media, erosion protection measures, and reclamation of slopes and other project disturbances.

3. The RWQCB would be the lead agency for design review of ore processing facilities utilizing chemical reagents in accordance with CCR Title 23, Chapter 15. Detailed final designs for processing components would be required by the RWQCB prior to construction or phased expansion of individual facilities. The RWQCB would review facility designs and proposed operations for consistency with measures for the protection of surface and ground waters. This would include evaluation of potential effects of seismic activity on processing facilities.

4.2.4 MITIGATION MEASURES INCORPORATED BY PROJECT DESIGN

4.2.4.1 Topography

1. The following mitigation measures are incorporated by project design to minimize effects to topography.
   - Site roads would follow existing contours, where possible, to minimize topographic changes due to grading.
   - For areas where cut and fill construction is required, excavated material would be reworked into cut areas during reclamation to blend the surface with surrounding natural contours.
   - The process water ponds area would be graded during reclamation to drain freely and blend with surrounding topography.
   - The borrow area would be excavated and/or reclaimed to provide low slope angles (e.g., 5H:1V or less). If the onsite borrow area is used, the area would be graded to drain freely when borrow activities are completed.
   - Slopes of the heap leach pile would be regraded during reclamation to slopes of about 3H:1V overall.
   - During final site operations and/or reclamation, waste rock pile slopes would be graded to break up unnatural straight line surface contours.

2. These mitigation measures would also be implemented for project alternatives, except the No Action Alternative. For the No Action Alternative, no mitigation would be required.

4.2.4.2 Geology

1. The following mitigation measures are incorporated by project design to minimize potential effects of seismic activity:
   - The leach pad and other processing facilities would be located 100 feet or more from known fault traces.
   - Leach pad slopes would be constructed at overall slopes of about 2.5H:1V or less with benches for stability. During reclamation, slopes would be regraded to 3H:1V.
   - Waste rock pile slopes would be constructed at overall slopes of 2.5H:1V to provide stability. Benches would be included at regular intervals to catch minor raveling.
   - Mine pit slopes would be evaluated throughout operations, so that excavation occurs at a slope angle that is safe considering actual rock strength and structural conditions encountered. Benches would be provided to catch loose rocks.
   - Earthquake contingency arrangements would remain in place for the operating life of the Briggs Project that would include provisions for emergency generators and pumps and a cyanide-destructing compound to be available on short-term notice. Details of the contingency plan would be submitted for BLM and County approval prior to the introduction of

cyanide to the processing circuit. The contingency plan would be implemented in the event that an earthquake were to occur resulting in the containment integrity of the leach pad or solution ponds becoming suspect.

2. As discussed in Section 3.2.2.2, it is not expected that paleontological resources could be impacted by the project. However, if fossils are discovered, work in the area would cease and BLM would be notified.

3. These mitigation measures would also be implemented for project alternatives, except the No Action Alternative. For the No Action Alternative, no mitigation would be required.

4.2.4.3 Soils

1. The following mitigation measures are incorporated by project design to minimize potential loss of soils:
   - Soils would be salvaged in areas to be disturbed, in accordance with the reclamation plan. Stockpiled soils would be used to resoil disturbed areas.
   - Growth media stockpiles would be stabilized by a planting with a seed mixture designed for rapid establishment, and/or other measures such as mulching or chemical stabilization, as necessary.
   - Soils at areas subject to minimal disturbance, such as soil stockpiles and water well sites, would be left in-place and stabilized, as necessary, in accordance with the reclamation plan.
   - Soil stockpiles would be clearly marked by signs on all four sides to prevent inadvertent disturbance. Canyon would keep records of the age of growth media stockpiled, and would stockpile and utilize growth media in a manner that minimizes the amount stored for over two years. Measures would be taken to restore biological potency of soils stored for an extended period of time. Example measures include introduction of natural inoculating materials (e.g., roots), mixing of older and newer soils, and reinoculation with commercial amendments.
   - Water bars, rip-rap and other stabilization measures would be incorporated into the site drainage system, where required to control erosion. Site drainages would be inspected periodically to assure that excessive erosion is not occurring. If excessive erosion is detected after a rainstorm, it would be mitigated and reported to BLM and the County.
   - Areas disturbed during construction that will not be subject to additional disturbance for three years or more, would be seeded in accordance with the reclamation plan prior to the first growing season to reduce erosion potential.
   - Surfactants would be used as part of the dust control program to reduce the amount of high TDS water applied to site roads.

2. These mitigation measures would also be implemented for project alternatives, except the No Action Alternative. For the No Action Alternative, no mitigation would be required.

4.2.5 RESIDUAL IMPACTS

4.2.5.1 Topography

1. The topographic impacts of grading for roads, building pads, ditches, ponds, etc., would be mitigated during reclamation so that the residual long-term impact is minor.

2. Topographic effects of the heap leach and waste rock piles and the mine pit cannot be fully mitigated. On a site-specific scale, the topographic changes due to these features would be substantial. Also, Manly Fall, which is located within the planned mine pit cannot be avoided. It would be removed by excavation of the mine pit.

3. Slopes of the heap leach pile, which would be located on the uniform terrain of the alluvial fan, would be regraded to 3H:1V overall during reclamation. Interbench slope angles of the waste rock piles and mine pit slopes would not be substantially altered. The mine pit and waste rock piles would be contiguous with the steep natural contours of the mountain flank. Because the vertical relief and slopes that would occur would not be unlike those naturally occurring in the region, topographic effects would not be significant.

4.2.5.2 Geology

1. With the presence of active fault traces traversing the project site and, on a broader scale, the seismically active nature of California and adjacent areas, there is potential for seismic shaking of project facilities. There is also potential for surface rupture at the site, although the likelihood of surface rupture occurring during the six-year operational period of the project is very low. Buildings, structures and processing facilities would be set back from active fault traces and would be designed to minimize the potential for damage. Slopes that would be constructed onsite would be designed for stability.

2. In the unlikely event of a very large earthquake occurring during project operations, there could be damage to site facilities. The primary potential threat to public health and safety or the environment during operations would be due to a potential process solution release in the event containment systems are damaged. With design standards required by state

regulation and mitigation measures incorporated by project design, this risk would not be significant because:

- Facilities would be designed to withstand reasonably foreseeable ground shaking or surface rupture in accordance with modern engineering practices.
- The likelihood of extreme ground shaking or surface rupture occurring during the short project life is very low.
- Processing solution contains dilute concentrations of cyanide (about 250 ppm), and the planned contingency measures discussed in Section 4.2.4.2 would minimize the amount of processing solution that could be released.
- Any leakage that might occur would be naturally attenuated ~~mitigated by attenuation of cyanide~~ in the vadose zone and further attenuated by dilution if any leakage were to reach ground water. Under the worst-case scenario, only low levels of cyanide in ground water could occur and clean up would be required in accordance with water quality protection laws and regulations.
- ~~There are no ground water users downgradient or reasonably foreseeable uses of downgradient waters that could be impaired because of the naturally poor ground water quality.~~

3. Because of the close proximity of the Panamint Valley Fault Zone, it is likely that over the long-term there will be occasional large earthquakes that could cause raveling or sloughing of mine pit and waste rock pile slopes. The hazard presented would not be unlike that naturally occurring in the area because of the steep nature of the Panamint Range. Therefore, the effect would not be significant.

4. Overall, potential effects of surface rupture and ground shaking would not be significant because, with the design standards required by state regulations and mitigation measures incorporated by project design, no substantial impact to public health, safety or environmental resources would be anticipated.

4.2.5.3 Soils

1. Disturbance of soils at the site is an unavoidable impact of project implementation. Because soils would be salvaged to the extent practical and soils present in the area are rocky and nutrient poor, the loss of soil would not be significant.

2. Due to the coarse rocky nature of soils present onsite, substantial erosion by wind or water would not occur. The project site is located in an area where rates of erosion and

sedimentation are naturally large when surface flow occurs. Most sediment transport occurs during infrequent flash floods. Because of these conditions, the Briggs Project would not significantly affect sedimentation or erosion.

4.2.6 MITIGATION MEASURES TO REDUCE RESIDUAL IMPACTS

1. Mitigation measures incorporated by project design, as discussed in Section 4.2.4, plus regulatory requirements discussed in Section 4.2.3, include the measures that would normally be required to minimize topography-, geology- and soils-related effects of a mining project. As discussed in previous sections, none of the impacts identified for topography, geology or soils would be significant. Therefore, CEQA does not provide authority for the County to impose additional mitigation measures. However, since visual impacts have been determined to be significant (Section 4.8), the County may impose additional mitigation measures to reduce the effects of topographic and vegetation impacts on visual resources.

2. BLM resource specialists recommend that an additional mitigation measure be adopted as a condition of approval of the Plan of Operations to reduce the potential for buildup of salts that could occur over time on roads that are in place for a substantial portion of the project life. BLM staff recommends that, as part of onsite road reclamation, Canyon should: (1) perform soils analyses on representative portions of onsite road surfaces where revegetation is planned; and (2) remove road base material where accumulation of salts by road watering may hinder revegetation. Evaluation of analysis results should be assessed by a qualified vegetation expert using criteria acceptable to BLM. Material removed from road surfaces should be deposited on the heap leach pad, prior to application of growth media to the heap. This additional recommended mitigation measure would be equally applicable to the Proposed Action or any of the alternatives except the No Action Alternative.

4.3 WATER RESOURCES

1. This section discusses potential impacts to surface or ground water that could occur as a result of the Proposed Action and alternatives. The assessment of potential effects includes consideration of water pollution control regulation requirements and mitigation measures incorporated by project design to protect water quality. The following potential issues have been identified and are addressed in this section:

   - Drawdown of ground water levels due to water supply pumping and the potential for related effects on Redlands Spring and shallow ground water conditions at the playa, including the limited portions of the playa fringe that are considered jurisdictional wetlands.
   - Changes to surface water drainage patterns and the downgradient hydrologic balance due to project-related drainage control.
   - Possible impacts to surface or ground water quality due to natural geochemical characteristics of ore and waste rock.
   - Possible impacts to surface or ground water quality due to the presence and use of petroleum products and chemical reagents.
   - Changes to the occurrence of surface water at the playa due to the topographic depression that could result from borrow activity, if one of the playa borrow locations is used.

2. Impacts to water resources would be considered significant if any of the following were to occur:

   - Ground water in the Panamint Valley basin is substantially depleted.
   - Drawdown due to pumping substantially alters the hydrologic balance of the playa area.
   - Flow at Redlands Spring is interrupted.
   - Surface flow diversions substantially alter the hydrologic balance of downgradient areas.
   - Surface or ground water quality is altered to the extent that existing or potential beneficial uses are effected.
   - Erosion or sedimentation characteristics in the site vicinity are substantially altered.
   - Surface water conditions at the playa are substantially altered due to potential clay borrow excavation.

4.3.1 PROPOSED ACTION

4.3.1.1 Ground Water Drawdown

1. As discussed in Section 3.3.2.3, the mine pit is not expected to reach the ground water table so dewatering of the mine excavation would not be required.

2. Drawdown of the ground water table would occur due to pumping of water for project needs. As discussed in Section 2.2.2 and specified in Table 2.4, project water requirements are anticipated to average approximately 400 gpm (640 acre-feet per year), primarily for dust control. This rate of ground water withdrawal represents about 2 percent of the estimated 25,000 to 30,000 acre-feet per year rate of recharge discussed in Section 3.3.1.2. Because there is currently very little ground water withdrawal in the Panamint Valley (see Section 3.3), and withdrawal for the Briggs Project would be a small fraction of the recharge rate, overdrafting is not an issue.

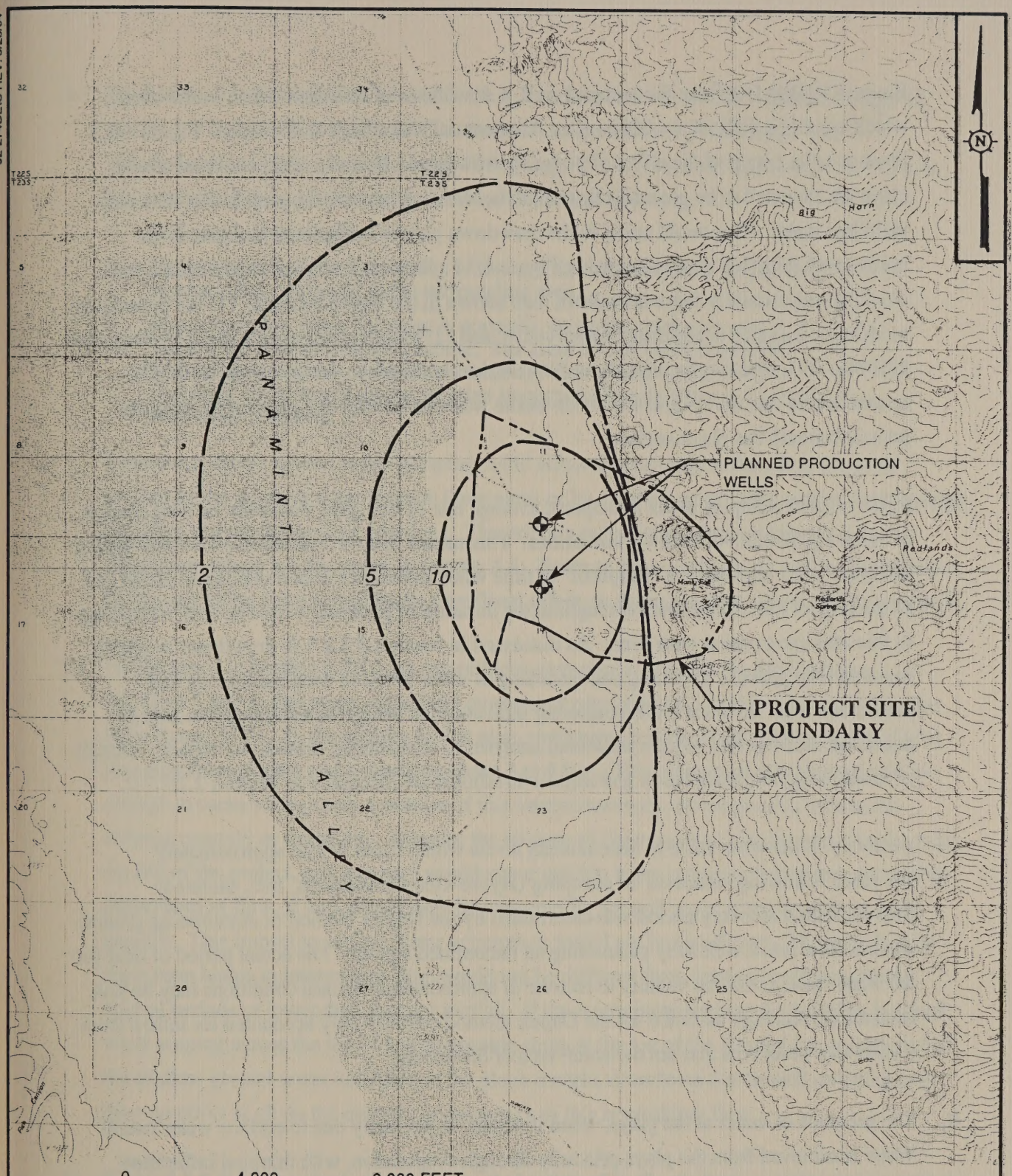
3. Based on the 400 gpm average withdrawal rate over the planned six-year project life, total water consumption would be on the order of 3,800 acre-feet. If it is conservatively assumed that a comparable water use rate would occur during the construction and reclamation periods, the total anticipated water demand is up to 5,100 acre-feet over an eight-year period. This volume of water represents about 0.1 percent of the 3.4 to 6 million acre-feet of water stored in the sediments of Panamint Valley, as estimated by DWR (see Section 3.3.1.2 for storage estimates).

4. The water supply study conducted for the Briggs Project by Hydro-Geo Consultants, Inc. included analysis of potential ground water table drawdown due to pumping of the 400 gpm average water use rate from the two planned ground water supply wells (Hydro-Geo Consultants, Inc., 1993c). The location of the two wells are shown in Figure 4.3.1. Each of the two wells would be pumped at an average of 200 gpm for up to eight years.

5. The Theis well equation was used for calculating the resultant drawdown using the average hydraulic conductivity obtained from the pumping test of Well GW-2 (12 feet per day). This equation calculates the drawdown around a constantly discharging well, fully penetrating a homogeneous aquifer. It also assumes that all pumped water is provided from the aquifer storage and that no recharge occurs. Because the assumption of no recharge is unrealistic, the calculated drawdown values were reduced by 30 percent based on Hydro-Geo's experience at other sites. The estimated drawdown anticipated to develop in the alluvial aquifer after eight years of pumping is as follows:

Distance from Pumped Well (feet)	Estimated Drawdown (feet)
2,000	13.4
4,000	6.2
6,000	4.0
10,000	1.8
12,000	1.1

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LEGEND

—5— AMOUNT OF DRAWDOWN IN FEET AFTER EIGHT YEARS OF PUMPING TWO WELLS AT AN AVERAGE RATE OF 200 GPM EACH

REFERENCE:

USGS TOPOGRAPHIC MAP OF MANLY FALL, CALIFORNIA, DATED 1988.

FIGURE 4.3.1

ESTIMATED GROUND WATER LEVEL DRAWDOWN AFTER EIGHT YEARS OF PUMPING AT 400 GPM

BRIGGS PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

Beyond 10,000 feet from the pumped well, a drawdown of less than 2 feet would occur, which would be difficult to differentiate from natural water table fluctuations. Figure 4.3.1 illustrates the extent of the effect of pumping drawdown. Because sediments beneath the playa are expected to be generally finer than the alluvium beneath the project site, they may yield less water. This could result in the drawdown pattern being more elongate in the north-south direction than indicated in Figure 4.3.1. However, it is not expected that there would be substantially more drawdown than shown in the figure because: (1) the drawdown modeling conducted is relatively conservative; and (2) pumping test results available from well 23S/44E-3N1, which is located about 3/4-mile inside the playa margin, show hydraulic conductivities that are comparable to the onsite wells, indicating that permeable strata are present beneath the playa surface.

6. Eight years of pumping at the anticipated average rate of 400 gpm would not be long enough to reach equilibrium drawdown conditions. This means that the estimated drawdown shown in Figure 4.3.1 represents a "snapshot" in time when drawdown is at a maximum at the end of the project life. Drawdown throughout the duration of pumping would be less, increasing to this maximum value over time. As discussed in Section 2.2.2.7.2, drawdown would be monitored by periodic sounding and recording of water levels in each monitoring and production well. If water level monitoring indicates that the projected drawdown may be exceeded, BLM would require additional analyses to characterize drawdown impacts. Details of monitoring, data evaluation and impact thresholds are discussed in Section 2.2.2.7.2.

7. Recovery of the water table to near existing levels would occur within approximately 2.4 years following cessation of pumping (Hydro-Geo Consultants, Inc., undated). This estimated recovery period was determined by the Dupuit method of determining ground water inflow into a well fully penetrating an unconfined aquifer. The actual period of time for the water table in the site vicinity to recover to approximately natural conditions may be less, because the recharge assumed for the Dupuit method estimate only accounted for inflow from a relatively small area and not the entire area of drawdown.

8. The presence of water at the playa, when it occurs, is primarily due to surface water runoff. Water is removed from the playa primarily through evaporation, with minimal infiltration because of the very low permeability of fine-grained playa deposits. Therefore, ground water drawdown due to project water supply pumping would not significantly affect the frequency or quantity of standing surface water at the playa.

9. As discussed in Sections 3.3.2.1 and 3.4.2.4, a narrow band within the vegetated fringe of margin has been defined by the COE as wetlands subject to their jurisdiction. The jurisdictional wetlands occur within the Slate Range WSA. These wetlands are limited in size and considered to be of low ecological value due to the following:

   - Soils are highly alkaline.
   - Vegetation density and variability is low and there is little or no change in vegetation as compared to the surrounding area.
   - Water quality is poor, and there is normally no surface water present. There is no perennial aquatic habitat. The areas do not fulfill important hydrologic roles such as flood attenuation, water quality attenuation, control of circulation patterns, or other important characteristics associated with some wetlands.

   Drawdown due to ground water pumping could affect the wetlands at the playa fringe by increasing the depth to water beneath these areas or by drawing more saline waters from beneath the playa toward the wetland locations. The primary potential result would be impacts to vegetation, which are discussed in Section 4.4. Because these wetlands do not fulfill important hydrologic roles, there would be no significant effect on water resource aspects of the wetlands.

10. As discussed in Section 3.3.2.1, an intermittent seep occurs at toe of the alluvial fan at Big Horn Canyon following substantial amounts of precipitation. This location is within the Slate Range WSA. In the vicinity of this seep, maximum drawdown of the water table due to pumping from project wells would be about 3 to 4 feet. This amount of drawdown could be enough to cause a temporary cessation of this intermittent seep, or temporarily reduce the seepage quantity or frequency. Because the amount of drawdown would increase slowly over the life of the project, and recovery would occur quickly when pumping is stopped, noticeable differences in flow, if any, would only be expected for several years when drawdown is the greatest. This impact to surface water occurrence would not be significant. The reduction or short-term hiatus in intermittent flow would not be different from natural conditions during normal periods of lower than average rainfall. If the intermittent seepage is caused by perched water seeping across the top of less permeable strata at the toe of the alluvial fan, as opposed to the shallow ground water condition at the playa margin, drawdown due to well pumping may have no effect at all on the quantity or frequency of this intermittent flow.

11. Figure 3.3.5 illustrates the hydrogeologic relationship of Redlands Spring relative to the project area where ground water withdrawal would occur. The water supply pumping wells would extract water from the porous alluvial basin ground water regime at an elevation that is about

1,500 feet lower than Redlands Spring, which occurs in the fractured basement rock ground water regime. As shown in Figure 3.3.5, the spring is caused by two important factors:

- It is supplied from the mounded ground water within the portion of the Panamint Range upgradient from the spring. The source of this water is infiltration of precipitation into joints and fractures of the rock above the spring area.
- The spring discharge location occurs where ground water seeping down the mountain flank from above encounters a north-south trending fault zone (Figure 3.2.2) that creates a very low hydraulic conductivity area immediately downgradient from the spring. This forces the water to the surface. After being forced to the surface, it flows some distance downstream on the surface, bypassing the low hydraulic conductivity area, and then seeps back into the rock.

12. The lowering of the ground water table at the mine site area, and excavation of the mine pit, will not affect either of the above two key factors that cause the spring to occur. Neither activity affects the recharge area above the spring or the low conductivity area located below the spring. The edge of the mine pit will be over 3,000 feet from the spring and about one-half mile from the area where the spring water re-infiltrates back into the rock.

13. During the EIS/EIR scoping process, a question was raised as to whether project-related ground water withdrawal could effect spring flows within DVNM. A number of springs occur within the monument boundaries along the east side of the Panamint Range. Many of these springs occur at high elevations and are most likely structurally controlled similar to Redlands Spring. The mounded ground water condition within the bedrock of the Panamint Range would not be affected by the Briggs Project. The mountains constitute a low permeability ground water regime that is not influenced by the alluvial basin ground water regime. Therefore, there would be no impact to springs that are located on the Death Valley side of the Panamint Range.

14. About two miles beyond the pumping wells, the drawdown that would occur in the alluvium of the Panamint Valley would not exceed normal seasonal fluctuations. This amount of drawdown would not affect interbasin flow (in or out) through alluvium connecting the Panamint Valley to adjacent basins.

15. As shown in Figure 3.3.2, deep regional flow also occurs beneath the Panamint Valley in an eastward direction towards Death Valley. The regional flow is driven by differences in regional ground water elevation over the entire area between the Sierra Nevada Range and Death Valley, which, due to its low elevation, is the ground water sink for eastern California

and western Nevada. A number of springs occur on the floor of Death Valley below an elevation of minus 200 feet that may be fed by this regional flow. The estimated drawdown that would occur due to the project, as shown in Figure 4.3.1, would be much too small to measurably influence the regional (i.e., interbasin) ground water regime. Therefore, eastward flow toward Death Valley would not be measurably affected and these springs on the floor of Death Valley could not be impacted. The springs are located at an elevation that is nearly 1,100 feet lower than the proposed well field. The small amount of drawdown that would occur in the vicinity of the proposed well field would not materially affect the hydrologic gradient between the project area and the springs. Therefore, even in the unrealistic scenario that these springs were being recharged directly from the well field area (e.g., if a east-west water-transmitting fracture system is hypothesized as a worst-case scenario), there would be no measurable reduction in flow due to project water pumping.

4.3.1.2 Surface Water Drainage

1. The primary surface water drainage that would be affected would be ephemeral drainage from Redlands Canyon. The mine pit would remove the topographic drop in the canyon bottom known as Manly Fall and the apex area of the alluvial fan. The heap leach pile would traverse the midportion of the alluvial fan blocking much of the braided channel network. However, as discussed in Section 2.2.2.5, the site design allows the current drainage path of Redlands Canyon over the alluvial fan to be approximately maintained during operations.

2. The layout of the primary site drainage control structures is shown in Figure 2.14. For initial operations, Redlands Canyon would be allowed to drain through the mine pit area. This is not expected to interfere with operations because of the very infrequent occurrence of surface flow. Before the mine pit becomes a closed depression, Redlands Canyon would be diverted toward the south around the main (lower) portion of the mine pit and released near the dike constructed to protect the leach pad from channel migration. The dike and drainage channel design would include rip-rap, flow dissipation features (e.g., rock piles), or other appropriate erosion controls, as necessary.

3. The change of the Redlands Canyon discharge point would be very minor (see Figure 2.15). The area near the leach pad protection dike would be surveyed when the dike is installed and, if necessary, grading would occur or rock piles would be placed in the drainage channel to disperse flow to simulate natural drainage conditions before it is released to the adjacent WSA. The change in offsite drainage conditions would not be considerably different than changes that

occur naturally within the braided wash network of an alluvial fan surface. Under natural conditions, washes undergo frequent abandonment or incision in response to varying flow rates and the equilibrium distribution of the sediment load. This phenomena is the reason for the radially shaped alluvial fan surface. There may be minor changes in flows over the adjacent WSA (Manly Peak), but these changes would not be significant and would not affect the suitability of the area for wilderness review. Additionally, as discussed in Section 3.7, the portion of the WSA adjacent to the site is not recommended for wilderness by BLM or the DPA.

4. At project completion, the Redlands Canyon diversion would be regraded, returning the surface flow path to the mine pit. On infrequent occasions when substantial surface flow does occur, there may be standing water in the pit bottom until the water infiltrates or evaporates. Over the long-term, the pit would ultimately fill with sediment and intermittent ponding would cease to occur. Estimates of average sediment transport rates for Redlands Canyon (WESTEC, Inc., 1993b) indicate that the pit would fill with sediment in a period ranging from a couple of decades to about 100 years. The quality of water that may pond in the mine pit is expected to be good, as discussed in Section 4.3.1.3.

5. Approximate surface water mass balance analyses were completed to determine to what extent ponding could occur in the pit after severe precipitation events (Environmental Solutions, Inc., 1994). The results of the analyses indicate that for normal rainfall events ponding would not occur. However, after extreme storms such as the 10-year or 100-year events, ponding could occur to a depth of 100 to 180 feet and remain in the pit for several months to several years until the water evaporates or seeps into the rock surrounding the pit. As outlined in the table below, these findings were based on calculated storm runoff volumes and a range of bedrock hydraulic conductivity (k) in the pit area of 10^{-4} to 10^{-5} cm/sec. The calculations are discussed in detail in Environmental Solutions, Inc., 1994.

STORM EVENT RETURN PERIOD	APPROXIMATE RUNOFF VOLUME (acre-feet)	APPROXIMATE MAXIMUM DEPTH OF PONDING (feet)	APPROXIMATE DURATION OF PONDING	
			$k=10^{-4}$ cm/sec	$k=10^{-5}$ cm/sec
2 year, 24-hour storm	None	None	None	None
10-year, 24-hour storm	160	100	Less than 1 year	5 years
100-year, 24-hour storm	750	180	1 to 2 years	10 years

While there is no bedrock hydraulic conductivity test data available for the site, 10^{-4} cm/sec is an average hydraulic conductivity value for fractured metamorphic rock. The lower value of 10^{-5} cm/sec is also appropriate to consider because the mounding of ground water in the Panamint Range as discussed in Section 3.3 is characteristic of rock with low permeability.

6. Capture of the Redlands Canyon drainage by the mine pit following project closure would only effect the infrequent surface flow that occurs from the six square mile watershed of Redlands Canyon. The Panamint Valley playa receives runoff from the entire valley which has a watershed of about 1,700 square miles. The Redlands Canyon watershed, therefore, represents a few tenths of one percent of the area that contributes surface flow to the playa. Interruption of occasional flow from Redlands Canyon would not substantively affect surface water conditions at the playa.

7. The steep mountain slopes in the eastern portion of the site are naturally an area of high erosion. During infrequent events of rainfall substantial enough to result in surface flow, loose soil and rock are transported downslope to the valley floor. Over the long-term, the rate of erosion of the mountain slopes is controlled by the rate at which the rock weathers to produce loose material. Within the alluvial fan and playa area, there is naturally a high rate of transport and deposition of sediment derived from the adjacent mountains. Most sediment transport in this desert environment occurs during brief flash flood events when large amounts of erosion and downgradient deposition occur naturally. The braided channels on the alluvial fan surface become active or abandoned in response to varying flow rates and erosion and sedimentation during surface flow events. Because of the nature of this system, it is not highly sensitive to induced flow changes. Changes to characteristics of erosion and deposition that may occur as a result of surface drainage diversions would be expected to be localized.

8. Subsidence due to ground water drawdown would be negligible and would not affect surface drainage. Generally, excessive subsidence due to ground water pumping is a concern only where the drawdown is large and/or where subsurface materials are fine-grained (e.g., primarily silt or clay). Considering the small amount of anticipated drawdown that could occur in the vicinity of the well field, and the coarse nature of the alluvial deposits, subsidence due to ground water withdrawal would not be expected to exceed a couple of inches. Away from the well field subsidence would be even less.

9. The removal of Manly Fall would impact the potential noncontact water recreation beneficial use discussed in Section 3.3.2.5 for the intermittent surface water flows. The removal of Manly Fall is unavoidable. Also, the diversion of the Redlands Canyon flow path would impact the wildlife beneficial uses associated with the ephemeral flows within the braided channels of the alluvial fan. The diversion is designed to minimize the degree of change to the downgradient environment during operations. Because of the infrequent nature of surface water flow from Redlands Canyon, and the minor reach of drainage that would be affected, these impacts would not be significant. Additional discussion of aesthetic and cultural resource issues related to Manly Fall and the Bennet-Arcan Party trail are provided in Sections 3.8, 3.9, 4.8 and 4.9.

~~9.~~ 10. The offsite mitigation discussed in Section 2.2.4 that would occur as part of the Proposed Action would provide some benefits to surface water resources. Although surface water impact mitigation would not be a primary goal of the offsite mitigation program, benefits ~~would~~ could occur through the removal of waste and debris that may degrade water quality, and through surface stabilization measures to control erosion. The extent of these benefits would depend upon the specific sites and activities of the offsite program. ~~which would be agreed upon prior to BLM's Record of Decision.~~

4.3.1.3 Ore and Waste Rock Geochemistry

1. A detailed characterization of the geochemistry of ore and waste rock expected to be excavated was conducted by Geochemica, Inc. in 1993. The report of this study entitled *Geologic Materials Waste Characterization Report, Briggs Project* (Geochemica, Inc., 1993) is hereby incorporated by reference.

2. Mining wastes are regulated by Article 7 of CCR Title 23 Chapter 15, which requires that wastes be characterized with respect to their potential to degrade water of the state. Geochemical components of the characterization include evaluating:

   - The potential for ore and waste rock to generate acidic runoff due to the oxidation of sulfide minerals.
   - The concentration of metals in ore and waste rock that could become available to the environment.

   In addition to ore and waste rock, material that would remain in the pit walls must also be considered because, after mining is complete, the pit walls are also subject to oxidation and weathering processes similar to the waste rock and heap leach piles. The rock that would

remain in the pit walls at the Briggs Project site would primarily be the same as the waste rock that will be excavated. A small amount of ore-type rock would also remain exposed in the final mine pit walls.

3. Fifty-three samples of the various types of materials that would be encountered during mining were analyzed (35 waste rock, 8 processed ore, 5 raw ore and 5 alluvium). A summary of acid generating potential results is provided in Table 4.3.1. Results for analysis of metals are summarized in Table 4.3.2.

4. Acid generating potential was evaluated utilizing generally accepted static testing procedures that estimate: (1) the amount of acid that could possibly be generated by weathering of sulfide minerals in the sample; and (2) the amount of acid that other minerals in the sample are capable of neutralizing. Results are expressed as a ratio of neutralization potential (NP) to acid generating potential (AP). A ratio greater than one indicates that, based solely on the quantity of minerals in the sample, there is a net potential to neutralize acid, and therefore, acidic runoff conditions would not be expected. Because the rate of possible acid production and acid neutralizing reactions is not considered in static testing, results are interpreted conservatively.

5. As shown in Table 4.3.1, the NP:AP ratio of most of the material that would be encountered is high, indicating no potential to generate acid. An NP:AP ratio of about 3 is generally accepted as a conservative indication that acid generation cannot occur, even in humid climate conditions.

6. The alluvium, waste rock and raw (unleached) ore have NP:AP ratios well above this conservative value. Therefore, the waste rock piles and the mine pit would not have potential to generate acidic water conditions. With one exception, each of the four types of ore residue on Table 4.3.1 also have NP:AP ratios of about 3 or more. The exception is unoxidized ore residue sample type "E" with an NP:AP ratio of about 1.3. A portion of the heap leach pad will consist of this type of material. If the Briggs Project site was in an environment with moderate or high rainfall, an NP:AP results of 1.3 may warrant further testing (e.g., humidity cell testing). However, because of the dry climate, there is minimal potential to generate seepage from the heap leach pile. Furthermore, the ore types would be mixed on the heap leach pile so the average NP:AP ratio would be higher. Finally, it should be recognized that the NP:AP ratio criteria of about 3 is a guideline that can be used to conservatively dismiss concerns of acid generating potential for virtually any site conditions. In arid climates, lower values are often used (e.g., the state of Nevada Division of Environmental Protection uses 1.2

TABLE 4.3.1

SUMMARY OF ACID-BASE ACCOUNTING

MATERIAL TYPE	NUMBER OF SAMPLES	AVERAGE REPORTED RESULTS		
		Total Sulfur Acid Generating Potential (AP) (tons $CaCO_3$/kt)	Acid Neutralizing Potential (NP) (tons $CaCO_3$/kt)	NP:AP
ALLUVIAL FAN	5	0.48	147.0	306
WASTE ROCK[1]				
AUW	5	3.7	171.7	47
AW	5	3.3	132.8	40
F	5	0.3	48.9	163
G	5	0.4	140.3	334
QUW	5	2.8	28.4	10
QW	5	0.9	36.6	42
UP	5	0.3	70.0	233
RAW ORE	5	15.3	111.9	7
ORE RESIDUE[2]				
A/B	2	16.1	85.7	5.3
C	2	42.3	167.5	4.0
D	2	51.0	149.0	2.9
E	2	55.1	72.0	1.3

92-274 (4/29/95/cm)

Source: Geochemica, Inc., 1993.

(1) Waste Rock Sample Explanation

AUW = Unoxidized Amphibolite Gneiss
AW = Oxidized Amphibolite Gneiss
F = Fault Gouge
G = Alluvium
QUW = Unoxidized Quartz Gneiss
QW = Oxidized Quartz Gneiss
UP = Upper Plate Quartz Monzonite

(2) Ore Residue Sample Explanation

A/B = Oxide Ore Composite
C = Mixed Oxide/Unoxidized Ore Composite
D = Unoxidized Ore - North
E = Unoxidized Ore - South

TABLE 4.3.2

SUMMARY OF ORE AND WASTE ROCK METALS ANALYSIS RESULTS AND COMPARISON TO REGULATORY THRESHOLDS

PARAMETER	TOTAL CONCENTRATION (mg/kg)			TTLC	SOLUBLE CONCENTRATION (mg/L)			STLC
	Min	Max	Mean[1]		Min	Max	Mean[1]	
ALLUVIAL FAN (5 samples)								
Antimony	10.0	40.0	22	500	<0.10	0.20	0.12	15.0
Arsenic	7.0	22.0	12	500	0.08	0.12	0.10	5.0
Barium	64.0	90.0	74	10,000	1.28	1.85	1.6	100
Beryllium	<0.50	<0.50	(1)	75	<0.005	<0.005	(1)	0.75
Cadmium	0.50	2.40	1.2	100	<0.005	0.47	0.02	1.0
Chromium, Total	10.0	18.0	14	–	0.72	1.29	1.1	–
Chromium (VI)	NA[2]	NA[2]	NA[2]	500	<0.01	<0.01	(1)	5.0
Chromium (III)	NA[2]	NA[2]	NA[2]	2,500	0.72	1.29	1.1	5.0
Cobalt	5.0	9.0	7.0	8,000	<0.03	<0.03	(1)	80
Copper	24.0	39.0	30	2,500	0.02	0.38	0.1	25
Lead	5.0	5.0	5.0	1,000	0.23	0.39	0.3	5.0
Mercury	<0.15	<0.15	(1)	20	<0.003	<0.003	(1)	0.2
Molybdenum	5.0	7.0	5.8	3,500	<0.05	<0.05	(1)	350
Nickel	19.0	24.0	21	2,000	0.63	1.25	1.0	20
Selenium	<0.50	<0.50	(1)	100	<0.10	<0.10	(1)	1.0
Silver	6.0	8.0	7.4	500	<0.01	<0.01	(1)	5.0
Thallium	10.0	100.0	46	700	0.20	0.30	0.26	7.0
Vanadium	33.0	38.0	36	2,400	0.20	0.32	0.28	24
Zinc	32.0	38.0	35	5,000	0.23	0.45	0.35	250
WASTE ROCK (35 samples)								
Antimony	<10.0	50.0	16	500	<0.10	0.50	0.2	15.0
Arsenic	<5.0	50.0	12	500	<0.05	0.28	0.1	5.0
Barium	28.0	210.0	78	10,000	1.0	4.11	2.3	100
Beryllium	<0.50	<2.0	0.7	75	<0.005	0.017	0.006	0.75
Cadmium	<0.50	2.0	0.8	100	<0.005	0.27	0.04	1.0
Chromium, Total	2.0	65.0	12	–	0.26	1.05	0.6	–
Chromium (VI)	NA[2]	NA[2]	NA[2]	500	<0.01	<0.01	(1)	5.0
Chromium (III)	NA[2]	NA[2]	NA[2]	2,500	0.26	1.05	0.7	5.0
Cobalt	<3.0	40.0	9.2	8,000	<0.03	0.90	0.2	80
Copper	8.0	148.0	32	2,500	<0.01	2.43	0.7	25
Lead	<5.0	58.0	11	1,000	<0.05	3.48	0.5	5.0
Mercury	<0.15	1.05	0.2	20	<0.0003	<0.0003	(1)	0.2
Molybdenum	<5.0	<20.0	7.0	3,500	<0.05	0.50	0.1	350
Nickel	<4.0	60.0	14	2,000	<0.04	2.15	0.4	20
Selenium	<0.50	<0.50	(1)	100	<0.10	<0.10	(1)	1.0
Silver	<1.0	25.0	7.0	500	<0.01	<0.01	(1)	5.0
Thallium	<10.0	80.0	19	700	0.10	0.40	0.2	7.0
Vanadium	<5.0	70.0	17	2,400	<0.05	0.39	0.1	24
Zinc	11.0	120.0	51	5,000	0.25	3.60	1.2	250

SOURCE: Geochemica, Inc., 1993.

(1) Where some results are nondetectable, detection limit is used to calculate mean. Where all results are nondetectable, the mean is not calculated.

(2) NA = Not Analyzed. Chromium speciation not required because total chromium is less than the regulatory threshold.

TABLE 4.3.2

SUMMARY OF ORE AND WASTE ROCK METALS ANALYSIS RESULTS AND COMPARISON TO REGULATORY THRESHOLDS (Continued)

PARAMETER	TOTAL CONCENTRATION (mg/kg)			TTLC	SOLUBLE CONCENTRATION (mg/L)			STLC
	Min	Max	Mean[1]		Min	Max	Mean[1]	
RAW ORE (5 samples)								
Antimony	10.0	50.0	20	500	<0.10	0.50	0.28	15.0
Arsenic	5.0	20.0	14	500	<0.05	0.06	0.05	5.0
Barium	35.0	84.0	55	10,000	1.37	2.80	1.9	100
Beryllium	0.50	2.0	0.92	75	<0.005	0.12	0.01	0.75
Cadmium	0.50	2.0	1.0	100	0.09	0.33	0.19	1.0
Chromium, Total	2.0	14.0	7.2	–	0.51	1.52	0.92	–
Chromium (VI)	NA[2]	NA[2]	NA[2]	500	<0.01	<0.01	(1)	5.0
Chromium (III)	NA[2]	NA[2]	NA[2]	2,500	0.51	1.52	0.92	5.0
Cobalt	9.0	20.0	14	8,000	<0.03	0.05	0.03	80
Copper	19.0	93.0	47	2,500	<0.01	0.07	0.03	25
Lead	5.0	23.0	13	1,000	0.24	1.02	0.64	5.0
Mercury	0.15	4.80	1.2	20	<0.003	<0.003	(1)	0.2
Molybdenum	<5.0	<20.0	(1)	3,500	<0.05	<0.05	(1)	350
Nickel	9.0	26.0	15	2,000	1.31	4.18	2.7	20
Selenium	<0.50	<0.50	(1)	100	<0.10	<0.10	(1)	1.0
Silver	9.0	20.0	13	500	<0.01	<0.01	(1)	5.0
Thallium	10.0	50.0	24	700	0.20	0.30	0.22	7.0
Vanadium	7.0	40.0	22	2,400	0.26	0.36	0.32	24
Zinc	43.0	98.0	64	5,000	1.29	3.15	1.9	250
ORE RESIDUE (8 samples)								
Antimony	<50.0	50.0	50	500	<0.10	0.20	0.1	15.0
Arsenic	<20.0	40.0	18	500	<0.05	0.20	0.1	5.0
Barium	226.0	304.0	258	10,000	0.98	1.97	1.6	100
Beryllium	<2.0	<2.0	(1)	75	0.005	0.011	0.01	0.75
Cadmium	<2.0	4.0	2.5	100	<0.005	0.01	0.01	1.0
Chromium, Total	10	25	18	–	0.15	0.31	0.2	–
Chromium (VI)	NA[2]	NA[2]	NA[2]	500	<0.01	<0.01	(1)	5.0
Chromium (III)	NA[2]	NA[2]	NA[2]	2,500	0.15	0.31	0.2	5.0
Cobalt	10.0	30.0	19	8,000	0.12	0.35	0.2	80
Copper	14.0	145.0	56	2,500	<0.01	0.45	0.1	25
Lead	<20.0	50.0	29	1,000	0.14	0.42	0.2	5.0
Mercury	0.16	1.11	0.5	20	<0.003	0.004	0.003	0.2
Molybdenum	<20.0	<20.0	(1)	3,500	<0.05	<0.05	(1)	350
Nickel	<20.0	20.0	20	2,000	0.13	0.20	0.16	20
Selenium	<0.50	0.60	0.51	100	0.20	0.70	0.3	1.0
Silver	<5.0	<5.0	(1)	500	<0.10	0.20	0.17	5.0
Thallium	<50.0	50.0	50	700	0.30	0.60	0.5	7.0
Vanadium	<20.0	30.0	21	2,400	0.05	0.10	0.1	24
Zinc	29.0	69.0	43	5,000	0.22	0.63	0.4	250

92-274 (4/29/95/cm)

SOURCE: Geochemica, Inc., 1993.

(1) Where some results are nondetectable, detection limit is used to calculate mean. Where all results are nondetectable, the mean is not calculated.

(2) NA = Not Analyzed. Chromium speciation not required because total chromium is less than the regulatory threshold.

as a guideline for requiring further testing). None of the samples tested indicated an NP:AP ratio of less than one, which would indicate a net potential for acid generation if a source of water was available.

7. Table 4.3.2 compares total and soluble metal concentrations from the 53 samples to the California Total Threshold Limit Concentration (TTLC) and California Soluble Threshold Limit Concentration (STLC) for hazardous waste. Although waste rock and leached ore residue are categorically exempt from regulation as a hazardous waste by state and federal laws, the TTLC and STLC criteria provide a measure for evaluation of metals analysis results. The state has determined that waste material with metals contents exceeding these values pose a substantial threat to health and the environment and, therefore, unless exempted, must be disposed of in accordance with stringent hazardous waste regulations. As shown in the table, total and soluble metals in the materials are low. None of the results approach or exceed TTLC or STLC limits. Over 90 percent of the average results are lower than the TTLC and STLC by a factor of 10 to 1,000.

8. The STLC extraction procedure uses an organic acid extraction on a prepared (crushed) sample. This type of extraction is intended to simulate leaching that might occur in a municipal waste landfill where organic acids are present. It was performed to characterize the ore and waste rock materials in accordance with state regulations. However, it does not simulate conditions that would occur at the project site because there would be no source of organic acids to leach metals from the ore and waste rock material.

9. To more closely simulate soluble metal conditions that might be capable of occurring at the site, each of the 53 samples was also tested using EPA Method 1312. This method simulates leaching of the ore and waste rock by rainwater. Metals evaluated by this procedure include arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver. With the exception of barium, values were below EPA specified detection limits. The soluble barium concentrations ranged from below detection limits up to 0.04 mg/L. This concentration is very low compared to the barium drinking water standard of 1.0 mg/L.

10. Due to the low metal concentrations, the extremely dry site environment, and the net neutralizing potential of the ore and waste rock, the geochemistry of the Briggs deposit would not pose a substantial threat to water quality. Based on the geochemistry testing results and preliminary discussions between Canyon and the RWQCB, it is anticipated that the waste rock

and the rinsed and abandoned leached ore residue would be classified as a Group C mining waste pursuant to CCR Title 23 Chapter 15, Section 2571.

11. Because of the low soluble metal concentrations and the high NP:AP ratio of ore and waste rock that would remain in the mine pit walls, it is expected that the quality of any water that could collect in the mine pit would be good (comparable to alluvial runoff). This water would be suitable for wildlife use.

12. Although current data on acid neutralization potential and acid generating potential suggest that acid mine drainage will not be generated by the materials at the site, the RWQCB will require ongoing sampling and characterization of waste rock and ore during the life of the project. Should results of future testing indicate that materials exposed in the finished pit may impact ground water quality beneath the pit, the RWQCB may require monitoring, mitigation, or both, to protect ground water quality. Such measures could include lining or backfilling the bottom of the pit, or any other measures the RWQCB may decide are necessary to protect waters of the state. The intent in having this statement included in the environmental document is not to require that any such measures be taken, but rather to acknowledge that the RWQCB has considered this potential environmental impact, and has a plan to address it in the unlikely event that it should occur.

4.3.1.4 Processing Solution, Reagent and Fuel Use

1. The primary water resource issue related to storage and use of reagents and fuels onsite is the potential for a substantive leak or spill that could affect surface water at the playa or ground water beneath the site area.

2. Fuels and oils that would be utilized at the site and may be stored in bulk tanks include lubricating oils, diesel fuel and gasoline. All bulk petroleum tanks would be completely aboveground and located within diked areas sized to contain at least 110 percent of the largest tank volume. The tanks would be constructed over concrete slabs or low permeability liners and routinely inspected for leakage or deterioration. Truck transfer areas for filling of bulk tanks would also be graded so that runoff from the area is controlled. With these measures, the likelihood of an oil spill or leak occurring that could affect surface or ground water quality is remote.

3. The potential for a release of processing solution or reagents to the playa would also be very low because processing facilities would be designed for zero-discharge in accordance with RWQCB requirements. Upgradient drainage controls would be provided to protect processing areas from run-on that could occur from the 100-year, 24-hour storm; and containment at the leach pad, solution transport ditches and ponds would be sized to accommodate rainfall directly onto these areas. The ponds would be sized to contain their normal operating volume of solution, plus solution that could drain from the heap if power were lost for 24 hours, plus a 100-year, 24-hour precipitation event, while maintaining adequate freeboard. Detailed engineering calculations documenting this capacity have been submitted to the RWQCB as part of their permitting and design approval process. Use of the 100-year, 24-hour storm criteria is conservative for the short-term of the Briggs Project. With properly designed and constructed containment facilities, a release of process solution that could effect surface waters is unlikely.

4. Reagent storage would occur over concrete slabs or lined areas with containment for potential spills. The leach pad, solution transport ditches and any ponds that may contain processing solution on a routine basis would be double-lined to prevent leakage that could seep to ground water. Effective liner design and installation is regulated by the RWQCB in accordance with CCR Title 23 Chapter 15 and is also of paramount importance to the project proponent to assure that water resources are protected and gold-containing solution is not lost. Final liner designs, detailed procedures for installation of liners, and quality assurance/quality control measures, would be reviewed by the RWQCB in conjunction with their design approvals and issuance of waste discharge requirements.

5. The liner system would include at least one low permeability synthetic (i.e., plastic) liner. Low permeability clay would be used for the lower liner of the leach pad, if enough suitable low permeability borrow material can be economically obtained. If enough clay cannot be obtained, double synthetic liners may be used. In reviewing the design details of synthetic liners, a number of factors are considered including: ground surface preparation and overliner protection to avoid liner penetrations, subsurface conditions, quality control procedures during construction, measures to minimize hydrostatic pressure over the liner, amount of load applied to the liner as a result of stacking ore on the pad, and monitoring arrangements. For clay liners, considerations include liner thickness and permeability, placement procedures, and quality control of material and installation. These evaluation parameters would result in high quality liner systems that would be expected to fulfill regulatory requirements and containment needs of the project.

6. A final line of defense against ground water degradation is the natural site conditions. Depth to water in the processing area ranges from about 70 feet to nearly 300 feet, depending on the ground surface elevation. Furthermore, with the dry desert climate, there is little movement of moisture downward from the surface. These conditions provide a natural barrier to ground water degradation. With the low trace metal content of ore material as discussed in Section 4.3.1.3, the primary compound of potential concern for ground water protection is cyanide. Cyanide is known to degrade quickly and/or complex to relatively nontoxic forms under ambient conditions. Numerous studies have demonstrated that cyanide can be attenuated within a short time and travel distance by the following mechanisms (Hutchison and Ellison, 1992):

   - Volatilization
   - Adsorption
   - Direct or complexation precipitation
   - Oxidation to cyanate
   - Biodegradation

   Rates of attenuation reactions, important reaction mechanisms, and attenuation effectiveness are site-specific and depend upon physical and chemical properties of the geologic materials (e.g., grain size distribution, pH, cation exchange capacity). Some attenuation mechanisms, such a volatilization or adsorption can occur quickly (e.g., over hours or days) and over short distances (a few inches to several feet) depending upon leakage rates and other factors.

7. The thick sequence of alluvial deposits that underlies the processing area, and the pH and low moisture content of materials in the vadose (unsaturated) zone, result in favorable conditions for attenuation of cyanide.

4.3.1.5 Playa Borrow Activities

1. Because of the low topographic relief of the playa surface, the depression that could result from excavation of borrow has the potential to act as a sump and collect water from the playa surface after rain events. If one of the playa borrow locations is used and reaches the maximum configuration of an approximately 4-foot depth over 47 acres, the excavation could retain about 190 acre-feet of water. When the depth of water over the playa surface is only a few inches, 190 acre-feet could be all the surface water that is present over as much as 800 or more acres. Draining of water into the excavation from the surrounding playa surface would be prevented by constructing a low (i.e., approximately 1 foot high) clay berm around the excavation following each phase of borrow activity. This measure would prevent capture of

water from the surrounding area, so the borrow excavation would not significantly affect the intermittent occurrence of surface water at the playa.

2. If one of the playa borrow locations is used and shallow ground water is encountered in the lower part of the excavation, there could be long-term standing water in the excavation if inflow through the low permeability playa soils exceeds evaporation. Evaporation would concentrate dissolved solids in the standing water. Between precipitation events, the standing water in the excavation could become saturated with dissolved salts and precipitation of salts could occur. The presence of surface water in the excavation, if it were to occur, and the potential associated hypersaline content, would not represent a significant effect to water resources because it would not be unlike naturally occurring conditions in the vicinity. Pools of hypersaline surface water occur at Post Office Spring near Ballarat and the high salt content and presence of evaporite deposits in the playa soils document the occurrence of hypersaline water on the playa surface over time. Ground water beneath the playa is known to range up to at least 272,000 ppm TDS (see Section 3.3.1.4), which is nearly eight times greater than the TDS of sea water (the TDS of sea water is about 35,000 ppm).

3. The north borrow area is located over one half mile from Post Office Spring and the margin of the playa. If this borrow area is used and shallow ground water is encountered, Post Office Spring would not be affected because of the intervening distance and because the water source for this spring is the uplands to the east of Ballarat.

4. The south borrow area is located near the playa margin where wetlands subject to COE jurisdiction occur. Minimal surface disturbance (about 0.02 acres) to wetlands would occur to provide access to the south borrow area, if used. The actual borrow excavation would be located to avoid the limited wetlands area that occurs at the playa margin. If shallow ground water is encountered by the borrow excavation, any induced change in the depth to ground water would be negligible in comparison to drawdown that may occur due to water supply pumping as discussed in Section 4.3.1.1. If the normal static water level is within the depth of this excavation, however, the recovered water table after cessation of water supply pumping may be slightly lower than the existing water table in the vicinity of the wetland. Even for the worst-case condition of this wetland being lost, the effect would not be significant because of the low value of the wetland as discussed in Section 4.3.1.1.

4.3.2 ALTERNATIVES

4.3.2.1 No Action Alternative

1. Under the No Action Alternative, the project would not be implemented. There would be no associated ground water withdrawal or modification of surface drainages. There would be no potential for a clay borrow excavation on the playa surface. Ore processing would not occur at the site and the remote potential for degradation of water resources would not occur. There would be no mine pit to impound water following occasional large rainstorms. There would be no offsite mitigation to benefit water resources.

4.3.2.2 Alternative Ore Beneficiation Rates

1. Overall project facility design and areas of disturbance would be the same for the alternative ore beneficiation rates as for the Proposed Action. There would be no material differences in surface water impacts, water quality impacts, or the occurrence of water in the mine pit following rainstorms.

2. Alternative ore beneficiation rates would result in minor changes to the rate and amounts of ground water withdrawal as compared to the Proposed Action. Because the primary project water requirements are related to dust control and make-up of evaporative losses, water consumption would be closely related to the length of time of ground disturbance and leaching, rather than the rate of ore processing. The increased ore beneficiation rate may result in a slightly higher rate of water extraction over an approximately two-year shorter period of time. Overall, a small decrease in the quantity of water used over the life of the project would be expected. Conversely, the slower beneficiation rate would require a slightly lower ground water withdrawal rate over an approximately four-year longer period of time. An overall increase in the amount of water utilized would be expected. Because the difference in water used would be very small compared to basin storage and recharge, the change in impact would be minor.

3. Under the alternative ore beneficiation rates alternatives, there would be no offsite mitigation to benefit water resources.

4.3.2.3 Reduced Project Size

1. The reduced project size would result in a water consumption rate comparable to that of the Proposed Action, but for an approximately two-year shorter period of time. The total amount of water withdrawn over the life of the project would be generally proportional to the

30 percent reduction of the project size. This would represent a water use reduction of about 1,500 acre-feet which is negligible in comparison to the estimated 3.4 to 6 million acre-feet of basin storage estimated by DWR.

2. With pumping of water at the same rate as the Proposed Action, but for a shorter period of time, there would be less drawdown of the ground water surface and recovery of natural water levels would begin about two years earlier. This would slightly reduce the potential to affect the limited wetland locals at the playa margin, and the intermittent seep that occurs at the toe of the alluvial fan at Big Horn Canyon after substantial precipitation.

3. The reduced project size would result in a smaller mine pit that would fill with sediment approximately 30 percent faster than the proposed configuration. This would result in intermittent ponding in the mine pit occurring over a period that would be years to decades shorter, based on estimated sediment transport rates discussed in Section 3.3.2.2. Other surface water impacts would not materially change as compared to the Proposed Action.

4. The reduced project size would result in a 30 percent reduction in the amount of fine grained borrow materials needed for leach pad liner construction. This would result in a corresponding reduction in the size and/or depth of potential borrow excavations on the playa surface. While there would be a reduction in the potential for a playa borrow source to affect water resources, the possible impacts would be similar. There would be no material change to the analysis of water resource impacts.

5. Under the reduced project size alternative, there would be no offsite mitigation to benefit water resources.

6. None of the differences in impacts as compared to the Proposed Action would be significant.

4.3.2.4 Balanced Waste Rock Piles

1. The balanced waste rock pile alternative would not change water impacts as compared to the Proposed Action, except for negligible reductions in water requirements due to the reduction in waste rock haul mileage and associated haul road dust control requirements. Canyon has included the offsite mitigation measures discussed in Section 2.2.4 in this alternative.

4.3.2.5 Partial Backfilling

1. The primary differences in water resource impacts for the partial backfilling alternative, as compared to the Proposed Action, would be increased water consumption of the project due to dust control requirements during the two-year backfilling operation and immediate restoration of free surface water drainage across the mine pit area following reclamation. Based on estimated sediment transport rates discussed in Section 3.3.2.2, the mine pit would backfill naturally to a free-draining condition within a period of a couple of decades to about 100 years.

2. With this alternative, standing water would not collect in the mine pit following infrequent rainstorms once reclamation is completed. This would reduce impacts of changes to surface water drainage patterns across the site. However, drainage could not be restored to natural conditions because the heap leach pad encompasses a large portion of the alluvial fan. Backfilling of the mine pit would allow drainage to occur over the fan in the approximate current drainage channel, but the heap leach pile would prohibit long-term natural channel migration over the fan surface.

3. Water requirements for dust control during the two-year period of partial backfilling would be substantial, but less than during the operational phase of the project. Some additional drawdown of the ground water table may occur, with recovery of natural water levels beginning two years later and requiring a slightly longer recovery period than for the Proposed Action. The potential for additional drawdown would result in a small increase in the potential to affect the limited wetland locales at the playa margin, and the intermittent seep that occurs at the toe of the alluvial fan at Big Horn Canyon after substantial precipitation. The effects of the additional water withdrawal would be greater than for the Proposed Action; however, the increase in impacts would not be significant.

4. Under the partial backfilling alternative, there would be no offsite mitigation to benefit water resources.

4.3.3 REGULATORY REQUIREMENTS THAT LIMIT PROJECT IMPACTS

1. The RWQCB would regulate project systems with the potential to discharge liquids to surface or subsurface waters. The review and permitting process would follow requirements of CCR Title 23 Subchapter 15, Article 7 (Mining Waste Management), the California Health and Safety Code, Chapter 6.67 (Above Ground Storage of Petroleum), the California Porter-Cologne Water Quality Act of 1985, and other applicable laws and regulations.

2. In compliance with applicable regulations, the RWQCB would require the use of materials and procedures to safely contain ore processing liquids, in order to achieve the closed zero-discharge system proposed for the project. These requirements include:

   - Low permeability liner systems for process solution ponds, solution transport ditches and the heap leach pad.
   - Drainage or diversion ditches outside the processing solution area to preclude entry of storm runoff into the system.
   - Adequate freeboard at the leach pad, solution transport ditches and solution ponds to safely contain storm runoff from within the heap leach system and draindown of solution from the leach pads in the event pumps could not operate because of a power failure.
   - A leakage detection monitoring system to assure process circuit containment is functioning as designed.
   - Regularly prepared reports on monitoring results and the current status of operations.
   - Neutralization of the heap leach pile and elimination of the solution ponds at the time of abandonment.

   The RWQCB would implement these requirements through detailed design review and issuance of waste discharge requirements. RWQCB requirements would also include posting of financial assurance by the project proponent. Requirements for this financial assurance are governed by CCR Title 23 Section 2550.0(b). The amount would have to be enough to initiate and complete corrective actions for any reasonably foreseeable potential release to the environment.

3. The RWQCB would also regulate storage of petroleum products in aboveground tanks exceeding 660 gallons in capacity. Requirements for bulk oil storage facilities include:

   - Development of a detailed SPCC Plan prepared in accordance with guidelines of 40 CFR Part 112.
   - Frequent visual inspections for leakage or deterioration of tanks, fittings or containment facilities.
   - Secondary containment for the entire contents of the largest tank, plus adequate freeboard.

4. A separate permit would be required from RWQCB regulating stormwater flows from site drainage facilities. Canyon may apply for coverage under a SWRCB blanket permit applicable to the mining industry. The stormwater discharge permit would require that a specific surface water sampling plan be developed for the site that would include periodic upgradient and downgradient sampling. Analysis of samples would be conducted and results reported to provide assurance that stormwater discharge water quality goals are satisfied.

5. Construction of the diversion for the Redlands Canyon drainage and excavation at one of the playa borrow areas, if used, would occur under Clean Water Act Section 404 permits issued by the COE. It is anticipated that the COE would regulate the Redlands Canyon diversion under a nationwide permit and borrow from the playa under an individual permit. Diversion of flow from Redlands Canyon would also require notification to DFG. The DFG may require a permit pursuant to the Fish and Game Code (Sections 1601 through 1607).

6. BLM would enforce 43 CFR 3809 regulations and surface management policies for mining to avoid unnecessary or undue degradation including regulation of surface drainage modifications and erosion control measures implemented during site construction, operation and reclamation. BLM requirements would include minimizing surface disturbance, use of riprap, water bars and other stabilization measures as necessary to control erosion, and reseeding of areas not subject to additional disturbance. BLM would exercise authority through review and approval of the project design and operations in conjunction with issuance of the Plan of Operations. The Plan of Operations would include stipulations under which the project would be required to operate.

7. The County would regulate reclamation activities related to stabilization of drainages and erosion control to assure consistency with SMARA requirements. This authority would be implemented through reclamation plan review and approval. The County would conduct inspections annually to assure compliance.

4.3.4 MITIGATION MEASURES INCORPORATED BY PROJECT DESIGN

1. The following mitigation measures are incorporated by project design to minimize impacts to water resources:

   - The drip irrigation method would be employed to apply solution to most of the heap leach surface. This would reduce evaporation, compared to the more conventional spray application technique.
   - Process water ponds would be fitted with floating covers (except the detoxification pond, which would be netted). This would reduce evaporation in comparison to other more conventional methods of wildlife control at ponds, such as netting or hazing.
   - Surfactants would be used as a part of the dust control program, which would reduce water consumption.
   - Measures would be taken to reduce erosion potential during project construction, operation and reclamation. In addition to practices such as use of stabilized drainage ways, riprap, water bars, and other standard

engineering measures that would be required by the County and BLM, the following would occur:

- Site roads and drainage facilities would be inspected after rainfall events resulting in surface flow. Maintenance would occur promptly, as needed.
- Drainage from the tops of waste rock piles would be directed away from the pile slopes.
- Salvaged soil would be stockpiled away from areas of concentrated drainage and seeded.
- Reclamation of disturbed surfaces would occur as soon as practical.

- Exposed portions of processing solution and reagent storage containment facilities would be routinely inspected for deterioration.
- Areas where toxic processing reagents are stored in bulk or used would be concrete or lined with drainage control to contain potential spills.
- A cyanide destructing compound would be maintained onsite (e.g., hydrogen peroxide or calcium hypochlorite) for use in the event that an environmentally threatening spill occurs. For minor spills that do not pose an immediate threat, effected soil could be excavated and placed on the leach pad in lieu of chemical treatment.
- Bulk fuel storage tanks would be located over concrete slabs or low permeability liners. Truck-transfer areas would be graded to contain potential spills.
- Hazardous waste would be handled and stored in accordance with applicable regulations, and transported offsite to an appropriately permitted treatment or disposal facility.
- Water withdrawal from the aquifer would be monitored and recorded to assure that projected water use rates are not exceeded.
- If one of the playa borrow locations is used, an approximately 1-foot high clay berm would be constructed around the excavation following each phase of borrow activities to prevent the excavation from draining the adjacent natural playa surface.

2. These mitigation measures would also be implemented for project alternatives, except the No Action Alternative. For the No Action Alternative, no mitigation would be required.

4.3.5 RESIDUAL IMPACTS

1. With the regulatory requirements discussed in Section 4.3.3 and mitigation measures incorporated by project design, impacts to water quality are not anticipated. The unavoidable adverse impacts of project implementation are water use for project needs and modifications to the surface drainage, primarily the diversion of the Redlands Canyon drainage. If one of the playa borrow locations is used, there may also be standing water in the excavation if shallow ground water is encountered.

2. Water use over the life of the project would total about 5,100 acre-feet. The effect of this withdrawal would be offset by recharge to the basin. The drawdown of the water table due to withdrawal at the project site would be localized to the immediate vicinity and would not significantly affect surface water, existing wells or sensitive resources. Recovery of the water table to approximate existing conditions would occur within about 2.4 years following cessation of pumping (Hydro-Geo Consultants, Inc., Undated).

3. Diversion of the Redlands Canyon drainage is unavoidable because the ore deposit to be excavated is located at the mouth of this canyon. Excavation of the mine pit would remove the topographic drop known as Manly Fall, and the apex area of the alluvial fan. The drainage can be diverted utilizing standard engineering practices and would not substantially alter downgradient hydrologic conditions or beneficial uses because:

   - Except for the mine pit, which would not disrupt drainage until it becomes a closed depression, site stormwater control facilities are designed in a manner that minimizes changes to existing drainage patterns. The current drainage path of Redlands Canyon over the alluvial fan would be approximately maintained.
   - Drainage pattern changes that would occur adjacent to the site would be minor, and would be similar to those occurring naturally as individual braided stream channels on the alluvial fan become active and inactive over time. Any changes to erosion or sedimentation characteristics that might occur would be expected to be highly localized.
   - The hydrologically downgradient area is limited. Water from Redlands Canyon, on infrequent occasions when surface flow does occur, flows over the project site area and then to the immediately adjacent playa.
   - There are no high quality or sensitive waters downgradient that could be affected. The playa is naturally a sediment sink for the entire southern Panamint Valley and, when water is present, it is of poor quality with a high TDS.
   - The approximately six-square mile watershed area of Redlands Canyon represents a small fraction (i.e., about 0.3 percent) of the total watershed for the playa, so overall, the frequency or amount of water at the playa would not be materially affected after mining when the Redlands Canyon drainage course is intercepted by the mine pit.

4. Based on the criteria identified, the residual impacts to water resources would not be significant. Mitigation measures incorporated by project design, in conjunction with regulatory requirements discussed in Section 4.3.3, include those efforts that are practical to minimize impacts to water resources. Therefore, none of the impacts would comprise unnecessary or undue degradation of federal lands. No additional mitigation measures are recommended.

4.4 VEGETATION

1. This section provides an analysis of impacts to vegetation that could result from the Proposed Action and alternatives. Mitigation measures to reduce these impacts are also provided in this section.

2. Impacts to vegetation would be considered significant if the following were to occur:
   - Substantial effects to a rare or endangered plant species.
   - Substantial effects to a plant species which, although currently not listed as endangered or rare, can be shown to meet the criteria of such species as defined in Section 15380(b) of the CEQA Guidelines.
   - Substantial diminishment of a plant community.

   ~~As discussed in Section 1.4.3.2, rare or endangered species have been construed to include other sensitive species and Species of Special Concern as identified by the DFG as a trustee agency under CEQA.~~

4.4.1 PROPOSED ACTION

4.4.1.1 Plant Community Impact

1. The proposed Briggs Project would impact vegetation primarily through the direct removal of plants by surface disturbance related to the construction of facilities. Approximately 505 acres of surface disturbance would occur for development of the mine pit, waste rock piles, leach pad, process facilities, soil storage and roads, and other facilities. About 35 acres of this area has already been heavily disturbed.

2. With the exception of the borrow area, all of the vegetation to be removed would be within the creosote bush plant community where the average ground coverage is approximately 12.1 percent. Most of this disturbance would be on the alluvial fan surface where the creosote bush bajada subtype community occurs. The mine pit and waste rock piles would also impact the "upland" subtype of the creosote bush plant community.

3. The soil borrow area could disturb up to 47 acres. If the onsite location is used, this disturbance would also occur primarily to the creosote bush bajada subtype community, plus several (i.e., about 5) acres of the desert sink plant community. If one of the playa borrow locations were used instead of the onsite location, there would be 47 acres less vegetation impact due to surface disturbance because the playa surface is not vegetated.

4. Disturbance would occur incrementally throughout the first several years of the project as the mine pit, waste rock piles, and leach pile are expanded until the ultimate project configuration is reached. Concurrent reclamation would occur to the extent practical (see Section 2.2.3) to minimize the amount of disturbance at any given time and to allow reestablishment as soon as possible.

5. The proposed reclamation plan includes revegetation of about 328 acres of the planned surface disturbance if the onsite borrow location is used, and 281 acres if borrow is obtained from the unvegetated playa surface. Grading, growth media application, seedbed preparation, seeding, fertilization and mulching measures are discussed in Section 2.2.3. The mine pit and waste rock pile slopes, totaling 177 acres, would not be reseeded. Some plants may become established naturally on these surfaces, for example, on the mine pit benches and along fracture zones on the mine pit walls. However, substantial revegetation is not expected to occur because of the lack of a surface profile to retain moisture and allow rooting. As discussed in Section 2.2.4, Canyon has incorporated offsite mitigation into the Proposed Action that would be designed to ~~compensate both in quantity and quality, for~~ offset disturbances that are not revegetated as part of reclamation.

6. As discussed in Section 2.2.3.4.2, for the portions of the site that would be revegetated, ~~Canyon has~~ the proposed success criteria are based on achieving a ~~50 percent weighted average ground cover~~ minimum of 20 percent density and minimum of 15 percent cover/canopy and diversity of the perennial shrub and herbaceous vegetation ~~as~~ compared to a ~~suite of test revegetation~~ predisturbance control plots ~~that would be established during project operations~~. Revegetation seed mixtures would emphasize shrub species native to the project site for reestablishment of a plant community similar to the existing community. The seed mix approved by BLM and the County would not include exotic species. The revegetation program would be expected to reduce impacts to vegetation over the short term, but is not anticipated that species density or diversity could be substantially reestablished through artificial means because of the harsh desert climate.

7. Natural revegetation of the disturbed areas would be expected to occur over the long-term, until the vegetation community is reestablished. Observation of vegetation conditions at similar desert locales indicate that native species of the creosote bush scrub community can reestablish naturally over the course of ~~a few~~ decades. The proposed reclamation plan focuses on growth media application and other seedbed preparation measures to encourage natural revegetation. These efforts would occur over all disturbed surfaces where there is reasonable opportunity for

success. Surfaces that would not be specifically prepared to induce natural revegetation include the mine pit and the slopes of the waste rock piles. Natural reestablishment of revegetation on these surfaces would likely be slow and sparse, and the long-term loss of productivity in these areas would be offset by offsite mitigation.

8. There is potential for establishment of noxious weeds in areas disturbed. These weeds can hinder vegetative productivity due to competition for soil moisture and nutrients. Canyon would implement a weed control program, if necessary. Specifics of the program would be subject to approval of the County and BLM prior to implementation. Mechanical or manual removal of weeds would be the preferred method where practical. Efforts would focus on an inspection and control plan that would minimize the potential for weeds to set seed. However, pre-emergent herbicides would not be used unless determined to be necessary by the County and BLM.

9. Surface disturbance that would occur at the proposed microwave station at the top of the Slate Range would amount to less than one-half acre. As for onsite disturbances, this impact would be to the Mojave creosote bush scrub community. In order to minimize vegetation disturbance, travel to the offsite microwave station from the existing road located approximately 340 feet away would occur overland without grading, and within a staked corridor. Construction crews would be required to minimize surface disturbance, including attempting to follow a common set of tire tracks on the overland portion of the access way. Similar procedures would be implemented when the facility is dismantled and the site is reclaimed. During operations, only occasional travel to the station would be necessary. The periodic access that may be required would also occur within the staked corridor.

10. In addition to vegetation impacts due to surface disturbance, drawdown due to ground water pumping has the potential to impact the desert sink vegetation community that occurs within the Slate Range WSA at the margin of the playa where ground water is shallow. A drawdown of greater than about 2 feet may be distinguishable from normal seasonal fluctuations and may occur over an approximately four-mile long segment of the playa margin (Figure 4.3.1). Toward the outer portion of the drawdown area, the minor increase in depth to ground water has the potential to slow the growth of vegetation species that rely on shallow ground water. Closer to the proposed well field, where drawdown is greater, plant survivability within the desert sink community could be affected. This impact to vegetation would not be significant. This vegetation community is widespread throughout the region. In the vicinity of the site, species diversity has been determined to be extremely limited (Cedar Creek Associates, Inc.,

1993a) and, combined with the very low vegetation density, this vegetation community "possesses little or no measurable ecological value" (Cedar Creek Associates, Inc., 1994). It consists primarily of iodine bush and has an average cover of about 6 percent (Cedar Creek Associates, Inc., 1993a). Iodine bush has an extensive deep root system that would make it tolerant to drawdown. Limited areas of jurisdictional wetlands that occur within this community are discussed in Section 4.4.1.2.1.

11. The planned disturbance to the Mojave creosote bush scrub community and possible impacts to the desert sink community would not be significant. These communities are common and widespread. The maximum anticipated impacts would not substantially diminish these communities.

4.4.1.2 Jurisdictional Wetlands Impact

4.4.1.2.1 Playa Wetlands

1. Onsite activities would not directly impact any of the jurisdictional wetlands in the site vicinity. However, if the south borrow area on the playa is used, an approximately 20-foot wide corridor of surface disturbance would occur across the playa margin to access the unvegetated playa surface. The access route would cross the narrow band of jurisdictional wetlands defined by the COE. Surface disturbance to jurisdictional wetlands would total about 1,000 square feet (about 0.02 acres). There would be no surface disturbance to jurisdictional wetlands if the north borrow area or the onsite borrow area were to be used.

2. Ground water drawdown due to pumping for the project water supply could indirectly affect the wetland areas at the margin of the playa by reducing the water supply to them. This potential indirect impact to vegetation would occur within the Slate Range WSA. Most of the wetlands area at the margin of the playa does not have vegetation that is distinguishable from adjacent areas within the desert sink plant community. A minor variation occurs at the two small locales identified by JBR (see Section 3.4.2.4). These locales would be monitored throughout the operational life of the project. Initial monitoring of these locales would consist of quarterly measurement of depth to soil saturation. Normal seasonal fluctuation of the depth to shallow ground water is expected to be about 2 feet. If the measured depth to saturation at these locales for two consecutive monitoring periods drops more than 2 feet as compared to the shallowest depth to saturation measured during baseline studies discussed in Section 3.4.2.1 (JBR, 1991; 1993), a vegetation stress monitoring program would be implemented. Stress monitoring would be conducted by a qualified biologist twice each year

during the growing season. If it is determined vegetation is being affected by ground water drawdown, mitigation would be employed as required by the BLM. Potential mitigation measures include artificially maintaining the shallow ground water level in the wetland areas until the cone of depression dissipates following project activities, or compensation by maintenance or restoration activities for a wetland in another area. Requirements for mitigation, if any, would consider the low ecological value of these wetlands as discussed in Sections 3.4.2.4 and 4.3.1.1.

3. If the south borrow area is used and shallow ground water is encountered by this borrow excavation, any induced change in the depth to ground water would be negligible in comparison to drawdown that may occur due to water supply pumping as discussed in Section 4.3.1.1. If the normal static water level is within the depth of this excavation, however, the recovered water table after cessation of water supply pumping may be slightly lower than the existing water table in the vicinity of the wetlands. Even for the worst-case condition of vegetation on a portion of the wetlands being lost, the effect would not be significant because of the low value of the wetlands.

4.4.1.2.2 Canyon Wetlands

1. None of the arrowwood scrub or alkali seep plant communities within Redlands Canyon would be affected by project development. This area is outside the project boundary and the hydrologic regime is separate from the alluvium that water would be pumped from for the project water supply (see Section 4.3).

4.4.1.3 Special Interest Species Impact

1. Based upon the vegetation inventories of the site and the proposed microwave station location, literature reviews of species distributions, and the various agency and organization plant lists, the proposed project would not affect any known or suspected threatened or endangered species.

2. A single individual of Knapp's brickellia, classified as a sensitive plant species by the CNPS (watch list), is located at the base of the northern facing canyon wall, approximately at the eastern boundary of the mine pit area. The FWS considers this taxon to be an invalid species and has removed it from consideration for listing (FWS, 1990) and the CNPS now also

considers this species invalid and will remove it from their upcoming lists (Skinner, 1993). Because of its changing status and the fact that it is currently only on a watch list, possible adverse impacts to this species are not considered significant.

3. At least 164 individual barrel cactus were observed in the study area on steep rocky slopes which could be impacted by the mining operation. The FWS considers this species to be too abundant or widespread for consideration of listing under the ESA. The CNPS has also decided to remove it from their lists in the upcoming inventory (Skinner, 1993). Potential impacts to this species, therefore, would not be considered significant.

4.4.2 ALTERNATIVES

4.4.2.1 No Action Alternative

1. The No Action Alternative would result in the Briggs Project and related surface disturbance not being implemented. There would be no additional disturbance to vegetation due to the Proposed Action and no offsite mitigation. Existing exploration disturbances related to Canyon's activities would be reclaimed.

4.4.2.2 Alternative Ore Beneficiation Rates

1. As discussed in Section 2.3.4, the final site configuration for the faster and slower ore beneficiation rate alternatives would be the same as for the Proposed Action. Therefore, there would be no difference in new vegetation disturbance. The differences in impacts that would occur under these alternatives, as compared to the Proposed Action, would be changes related to the modified duration of project activities and the absence of offsite mitigation.

2. The modified duration of project activities would result in minor short-term differences in impacts to vegetation. With the faster ore beneficiation rate, the duration of operations would be reduced to about four years (instead of six). There would be less time for revegetation test plots, but the reclamation process could be slightly accelerated. This would be considered a minor reduction in short-term impact to vegetation. If the operation rate were decreased, there may be slightly more opportunity for concurrent reclamation; for example, if portions of the waste rock piles become inactive prior to cessation of mining. A slower beneficiation rate would also allow about four years of additional time for revegetation experiments and test plots. However, overall, the revegetation of the site would be extended. Also, if the four-year delay in reclamation were to result in a wetter than normal period being missed,

revegetation of the site could be substantially slowed. Overall, extending final reclamation of the site under the slower beneficiation rate would be considered a minor increase in short-term impact.

3. The faster and slower ore beneficiation rate alternatives would not include offsite mitigation that Canyon has incorporated into the Proposed Action. The absence of long-term benefits from offsite mitigation would overshadow the minor short-term differences of the alternative ore beneficiation rates, resulting in an overall increase in impact for either the faster or slower rate.

4.4.2.3 Reduced Project Size

1. As defined for this alternative, the total tons of ore and waste rock to be mined would be reduced by 30 percent. Reduction in surface disturbance would not be comparable because the same area would be required for support facilities, roads, etc., and because the waste rock piles become more efficient with increasing size (i.e., volume increases faster than areal disturbance). For purposes of analysis in this document, it is estimated that the decrease in surface disturbance would be about 100 acres (approximately 20 percent less that the Proposed Action).

2. With a 20 percent reduction in the area of the mine pit and waste rock pile slopes, approximately 142 acres of the site would not be revegetated (177 x 0.8). Because there would be no offsite mitigation, this would represent an increase in long-term surface disturbance as compared to the Proposed Action. The permanent 142-acre surface disturbance increase outweighs the benefit of the 100-acre reduction in temporary onsite vegetation disturbance that would occur with this alternative.

3. As discussed in Section 4.3.2.3, the reduced project size alternative would result in a shortened duration of ground water withdrawal and a reduction in shallow ground water drawdown at the playa margin. While this would reduce the potential impacts to the desert sink vegetation community that occurs in this area, drawdown in the vicinity of the well field could still be enough to potentially affect this vegetation community; only the areal extent of potential impacts would be expected to be reduced. Because of the limited reduction in potential to affect vegetation and the common and widespread nature of the desert sink community throughout the region, the potential reduction for indirect short-term impacts to this community from ground water pumping would be minor.

4.4.2.4 Balanced Waste Rock Piles

1. Under this alternative, the waste rock piles would be balanced on each side (north and south) of the mine pit. The amount of vegetation disturbed for the overall project would not materially change. Estimated disturbance for the project facilities under this alternative is also 505 acres.

2. For the balanced waste rock pile configuration, there would be a small amount (about 6 acres) of additional waste rock pile slope area that would not be revegetated (Table 4.4.1). However, this minor increased impact would be offset by offsite mitigation and a slightly increased potential for revegetation success of waste rock pile benches, because there would be less south-facing exposure where growing conditions are the harshest. There would be no material difference from the Proposed Action for overall vegetation impacts.

4.4.2.5 Partial Backfilling

1. For the partial backfilling alternative, disturbance acreage, location and rate would be approximately the same as for the Proposed Action except for a net increase of about 13 acres of disturbance, due to the modified north waste rock pile configuration. Following partial backfilling, about 71 additional acres of site disturbances would be reclaimed with growth media application, seedbed preparation, and reseeding. However, there would be no offsite mitigation. As shown in Table 4.4.1, the net amount of disturbance that would not be reseeded would be increased as compared to the Proposed Action.

2. Partial backfilling would delay seedbed preparation and reseeding of the waste rock piles by about two years. This increase in short-term impact would be minor, unless the two-year delay resulted in a wetter than normal period being missed, that otherwise could provide an early boost for revegetation success.

3. The partial backfilling alternative would result in an increase in the potential to affect vegetation at the playa margin, because of the prolonged duration of ground water withdrawal for dust control. The magnitude, area, and term of ground water drawdown would be increased. This increase in potential to impact vegetation would not be significant, because of: (1) the low plant species diversity and density in the affected desert sink vegetation community; and (2) the common and widespread occurrence of this community throughout the region.

TABLE 4.4.1

COMPARISON OF DISTURBED AREA THAT WOULD NOT BE REVEGETATED

AREA[2]	ACREAGE THAT WOULD NOT BE REVEGETATED[1]				
	Proposed Action	Alternative Ore Beneficiation Rates (faster and slower)	Reduced Project Size	Balanced Waste Rock Piles Alternative	Partial Backfilling Alternative
Mine Pit	112	112	90	112	62
Waste Rock Dump Slopes	65	65	52	71	44
Area Revegetated by Offsite Mitigation	(3)	0	0	(3)	0
Net Unrevegetated Acreage	**0**[3]	**177**	**142**	**0**[3]	**106**
Total Acreage of Site Disturbance	**505**	**505**	**405**	**505**	**518**

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(1) Areas where reclamation measures would not include growth media application, seedbed preparation, or reseeding. Some natural revegetation may still be expected.

(2) If one of the playa borrow locations is used, it also would not be revegetated. The borrow area is not considered in this table, however, because the playa surface is naturally barren of vegetation.

(3) As discussed in Section 2.2.4, the offsite mitigation program would compensate, both in quantity and quality, for onsite disturbances that are not revegetated as part of reclamation. Offsite mitigation would occur with the Proposed Action or the balanced waste rock piles alternative, but not with the other alternatives.

4.4.3 REGULATORY REQUIREMENTS THAT LIMIT PROJECT IMPACTS

1. The BLM is responsible for preventing unnecessary or undue degradation of federal lands in accordance with 43 CFR 3809 regulations. The County is responsible for implementing SMARA. As directed by these agencies, the project applicant will implement a reclamation program, as discussed in Section 2.2.3, designed in conformance with the objective of federal and state policies for reclamation. Revegetation is included as part of the proposed reclamation plan.

2. The overall objective of site closure is to leave the project site in stable condition, compatible with surrounding land uses, and to provide the revegetated plant communities the maximum opportunity to achieve a climax condition. BLM and the County will require that Canyon post a bond in an amount satisfactory to these agencies to assure that appropriate revegetation efforts are completed.

4.4.4 MITIGATION MEASURES INCORPORATED BY PROJECT DESIGN

1. The following mitigation measures are incorporated by project design to minimize effects to vegetation:
   - Disturbance would be minimized to that necessary for safe and efficient operation. Limits of construction areas would be clearly marked (e.g., flagged prior to earthwork activities) and vehicles and equipment would be confined to these areas.
   - Suitable growth media would be salvaged and stockpiled for use in reclamation, in accordance with the approved reclamation plan.
   - A revegetation research plan would be implemented as soon as practical following project approval. A detailed plan for this program including proposed initial test plot locations, schedule, revegetation and husbandry techniques, etc. would be submitted to the County and BLM for approval within six months of project construction startup. Test plots would be monitored and statistically evaluated for density and cover percentage at a frequency acceptable to BLM and the County, and at a minimum, annually at the end of each growing season. Results of these analyses would be reported to the County and BLM in an annual report.
   - Revegetation efforts would be initiated as soon as practical in areas that would not be subject to additional disturbance. Growth media application, seedbed preparation, assessment of soil amendment needs, seeding techniques, mulching and revegetation success monitoring would occur as addressed in the approved reclamation plan.
   - The seed mix would emphasize shrub species native to the site area designed to reestablish a plant community similar to that which existed prior to disturbance.
   - Heap leach pad fencing would remain in place, at the discretion of the County and BLM, until vegetation is reestablished, or as otherwise specified in the approved reclamation plan.

- Monitoring for the potential establishment of noxious weeds would occur as a part of revegetation success monitoring. A program to control noxious weeds in a manner acceptable to BLM would be implemented, if necessary.
- A wetland monitoring program would be implemented to determine if the wetland exhibits stress due to a diminished water supply. If required by BLM, mitigation would be implemented to either enhance the water supply to the wetland or to compensate the loss or degradation of the wetlands. Because most of the jurisdictional wetlands identified by the COE do not have vegetation that is distinguishable from the surrounding desert sink plant community, the locations that would be monitored, and mitigated if necessary, would be the two small locales identified by JBR where a minor vegetation difference occurs. BLM would consider the low ecological value of the wetlands in determining ~~whether or not~~ mitigation ~~is required~~ requirements.

2. These mitigation measures would also be implemented for project alternatives, except for the No Action Alternative. Implementation of the No Action Alternative would mean that none of the existing vegetation would be disturbed by the Proposed Action. Since there would be no impact to these resources, no mitigation measures would be necessary.

3. Mitigation incorporated by project design also includes the offsite mitigation plan, as discussed in Section 2.2.4. Canyon has included this offsite mitigation in the balanced waste rock piles alternative. It would not occur under any of the other alternatives.

4.4.5 RESIDUAL IMPACTS

1. Surface disturbance for construction and operation of the proposed project is an unavoidable adverse effect of project implementation. For the Proposed Action, approximately 470 acres of vegetation would be disturbed over the six years of operation if the onsite borrow area is used (35 of the 505 acres of project facilities would be located in areas that are already disturbed). If one of the playa borrow areas is used, disturbance to vegetation would be about 47 acres less because the playa surface is not vegetated. The proposed reclamation plan includes revegetation of approximately 328 acres of onsite disturbances (or 281 acres if one of the playa borrow areas is used) using a seed mix that emphasizes native shrubs. Onsite vegetation disturbance that is not revegetated as part of reclamation would be ~~compensated~~ offset through the offsite mitigation program, so there would be no net long-term loss to vegetation resources.

2. Except for about 5 acres of potential disturbance to the desert sink plant community, all proposed surface disturbance would occur in the creosote bush plant community. Both of these communities are abundant throughout southeastern California and adjacent regions.

3. Based on extensive botanical surveys, no federal or state listed proposed or candidate rare, threatened or endangered plant species exist within the project boundaries or at the proposed microwave station location. Additionally, no species were observed which are listed as rare, threatened or endangered by the CNPS. Although one, and possibly a second species was observed on the site which is currently listed as sensitive (CNPS list 3) by the CNPS, it is anticipated that these species will be ~~removed~~ delisted soon.

4. Because there would not be substantial diminishment of plant communities and because no impacts would occur to any rare or endangered species, project impacts to vegetation would not be significant.

4.4.6 MITIGATION MEASURES TO REDUCE RESIDUAL IMPACTS

1. Minimizing surface disturbance, salvaging growth media, reclamation of the site to reestablish native species, and other measures discussed in Section 4.4.4, encompass the majority of measures that would normally be required to mitigate effects to vegetation. Residual impacts to vegetation would not be significant. Therefore, CEQA does not provide authority for the County to impose additional mitigation measures for vegetation.

2. Reclamation efforts in addition to those proposed have been identified that could increase the rate of reestablishment of the vegetation community on disturbed surfaces, thereby further reducing impacts to vegetation. BLM resource specialists recommend that the additional measures discussed in the following paragraphs be adopted as conditions of approval of the Plan of Operations. While the County cannot impose these measures for vegetation impacts, they could be imposed under CEQA pursuant to significant visual impacts of the project, as further discussed in Section 4.8.6.

3. BLM staff recommends that Canyon be required to include as part of the reclamation plan: (1) salvaging some of the native plants in areas to be disturbed; and (2) maintenance of these plants during operations in an onsite nursery for transplanting into disturbed areas during reclamation. Nursery activities should also include efforts to grow additional plants from cuttings and seeds obtained from vegetation in disturbed areas. If transplanting into disturbed

areas is successful, natural reestablishment of vegetation may be accelerated. Transplanted vegetation would increase attraction of the site to birds, insects and rodents, which bring in seeds, pollen and detritus. Although these effects would be expected to speed up succession of the plant community, the potential number of species that would be practical to maintain in a nursery would be low. Creosote bush and some cactus may be candidates. The natural vegetation of the site does not include as many species of plants that could be transplanted or grown as other sites where this technique has been employed (e.g., the Castle Mountain Mine in San Bernardino County, which receives substantially more rainfall than the Briggs Project site). Detailed lists of plant species that occur onsite are included in vegetation baseline study reports prepared for the project by independent consultants. Species selected for the recommended nursery program should be developed based on these reports, in consultation with BLM.

4. BLM staff also recommends that Canyon be required to include in their reclamation plan the placement of large rocks dispersed over the disturbed surfaces. The occurrence of occasional rocks in open areas would add some diversity and cover to encourage reinhabitance by animals that would add to overall biological productivity (by carrying seeds into the area, etc.). Shade provided by the rocks may also be of some advantage to the survival of small plants prior to their developing a mature root system. These conditions also could add to an improved rate of vegetation reestablishment in disturbed areas.

5. These additional recommended mitigation measures would be applicable to the Proposed Action or any of the alternatives except the No Action Alternative.

4.5 WILDLIFE

1. The following section evaluates the potential impacts of the Proposed Action and alternatives on wildlife. The identified wildlife issues are: (1) reduction of wildlife habitat associated with surface disturbance; (2) potential exposure of wildlife to reagents and processing solutions; (3) introduction of artificial lighting; (4) increased noise levels and human presence; and (5) traffic-related impacts.

2. Impacts to wildlife would be considered significant if any of the following were to occur:
   - Substantial disturbance of threatened or endangered wildlife species, or a species likely to become threatened or endangered in the foreseeable future (e.g., federal Category 1 species).
   - Substantial disturbance or destruction of habitat that supports threatened or endangered wildlife species, or a species likely to become threatened or endangered in the foreseeable future.
   - "Substantial disturbance or destruction of habitat that support wildlife species which, although currently not listed as endangered or rare, can be shown to meet the criteria of such species" as defined in Section 15380(b) of the CEQA Guidelines.
   - Substantial interference with the movement of resident or migratory wildlife species.
   - Substantial reduction of habitat for a wildlife species.

~~As discussed in Section 1.4.3.2, threatened or endangered species have been construed to include other sensitive species and Species of Special Concern as identified by the DFG as a trustee agency under CEQA.~~

4.5.1 PROPOSED ACTION

1. Potential impacts to wildlife could occur from both construction and operations activities associated with the project. Habitat would be reduced through surface disturbance and removal of vegetation, and direct mortality could occur to resident animals in burrows or nests destroyed by heavy equipment. Animals which would move (or be moved) offsite could indirectly affect animals in adjoining habitat by inducing temporary population stress. These and other potential effects of the project are evaluated in the remainder of this section. Impacts that could occur due to surface disturbances are discussed in Section 4.5.1.1. Impacts that could occur due to operational activities are discussed in Section 4.5.1.2.

4.5.1.1 Surface Disturbance Impacts

4.5.1.1.1 General Impact on Wildlife

1. The Proposed Action would impact wildlife primarily through the direct removal of habitat for construction of facilities. Approximately 505 acres of surface disturbance would occur during the estimated six-year operating period. Approximately 35 of these 505 acres are already disturbed. The offsite microwave station at the top of the Slate Range would disturb less than one-half acre of wildlife habitat. If the onsite borrow location is used, all of the disturbed habitat, except for about 5 acres of desert sink community, would be of the creosote bush plant community.

2. If one of the playa borrow locations is used, 47 of the 505 acres of disturbance would occur on the unvegetated playa which would generally affect different species than for the upland habitats. The reclamation plan includes revegetation of approximately 328 acres if the onsite borrow location is used, and 281 acres if one of the playa borrow locations is used.

3. The 177 acres that comprise the mine pit (112 acres) and waste rock pile slopes (65 acres) would not be reseeded. Some plants may become established naturally on these surfaces, for example, on the mine pit benches and along fracture zones on the mine pit walls. However, substantial revegetation is not expected to occur because of the lack of a surface profile to retain moisture and allow rooting . These areas would offer limited habitat for some wildlife, and would not be unlike the steep rocky slopes that occur naturally in the upland terrain. Although there would be little or no forage potential, the rock pile slopes would offer cover for small mammals and reptiles. The mine pit may provide suitable habitat for reptiles and raptors, and other animals when rainwater collects in the pit bottom. Project-related surface disturbances would encompass up to about 135 acres of steep rocky terrain, so the net increase of this type of terrain on the project site would be about 42 acres. As discussed in Section 2.2.4, Canyon has incorporated offsite mitigation into the Proposed Action that would be designed to ~~compensate for~~ offset long-term habitat disturbance due to onsite areas that are not revegetated as part of reclamation.

4. The habitats that would be disturbed are used by various animals common to the desert region, as described in Section 3.5. Removal of the vegetation would affect the species which rely on the vegetation for food and cover. Leach pad fencing would remain in place, at the discretion of the County and BLM, until revegetation efforts are complete. This would limit reestablishment of wildlife habitat to about 140 acres of the site for several years after the six-year operating life. Following removal of the fence, repopulation of this area by wildlife

would also occur. It may take several decades or more for the productivity and habitat value of disturbed areas to return to existing conditions.

5. The Proposed Action is not expected to result in ~~substantial direct interruption~~ significant disruption of wildlife movement ~~patterns~~ or result in ~~substantial~~ significant habitat fragmentation. The proposed project site and microwave station ~~location do not intercept known unique migration pathways and~~ would affect only a small portion of habitat that is ~~common~~ ubiquitous throughout the project region. The surrounding area is relatively undisturbed open space that would accommodate wildlife movement.

6. As discussed in Section 4.3.1.2, surface water runoff from Redlands Canyon, when it occurs, would collect in the mine pit following project operations until the pit eventually fills with sediment over the course of a couple of decades to about 100 years. Following large rainstorms (e.g., 10- to 100-year recurrence interval storms), water may stand in the bottom of the pit for several months to several years. ~~Wildlife would water at the mine pit when runoff is present.~~ As discussed in Section 4.3.1.3, ore and waste rock geochemistry is not expected to result in water chemistry that would be adverse to wildlife.

7. If one of the playa areas were used to obtain borrow, this activity would occur when the natural playa surface in the vicinity of the borrow area is dry. This would limit wildlife impacts and would facilitate borrow operations. Surface disturbance at the playa could destroy brine shrimp eggs that may occur in the dry shallow soils. Because only a small part of the playa would be affected, and because no ~~sensitive~~ protected or special interest shrimp species occur, this impact would not be significant.

8. As discussed in Section 4.3.1.5, if one of the playa borrow areas is used, an approximately 1-foot high clay berm would be constructed around the excavation to prevent a large area of the playa from being drained. On rare occasions when water at the playa is high enough to overtop the berm, the depression would fill with water. Because of the relative depth as compared to the rest of the playa, the depression could result in the prolonged occurrence of standing water. This would not be expected to negatively impact wildlife, but could enhance the habitat temporarily, following rainstorms, when fresh water may stand in the depression. If shallow ground water is encountered in the excavation, it is expected that evaporation would concentrate the TDS in the excavation so that it would be of little or no value to most wildlife. The exceptions may be brine shrimp and other animals that feed on them. Over time, the depression would eventually fill with sediment.

4.5.1.1.2 ~~Sensitive~~ Protected or Special Interest Wildlife Species

Desert Tortoise

1. As discussed in Section 3.5, the desert tortoise does not inhabit the project site. BLM, in consultation with the FWS, has made a No-Effect determination based on three surveys (Brown, 1989; NECI, 1992; Rado, 1994). A copy of a letter from FWS documenting their concurrence with the No-Effect determination is included in Appendix B. Though climatic changes could cause the range of the desert tortoise to expand, possibly allowing the area to be colonized by this species, at this time there would be no impact to the desert tortoise.

2. Tortoise do not inhabit the microwave station site or the offsite borrow locations. Therefore, these facilities would not impact the desert tortoise.

Mohave Ground Squirrel

1. As discussed in Section 3.5, the Mohave ground squirrel does not inhabit the project site area. Therefore, the mine would not adversely impact this ~~sensitive~~ species.

2. Although no sign of the Mohave ground squirrel was detected pursuant to biological studies of the microwave station location, it is within the expected range of this species. Construction of the microwave station would result in less than one-half acre of disturbance. About 0.1 acre of this disturbance would be due to construction of the microwave station building and security fence. The remaining 0.4 acres would be due to overland access (i.e., without grading) to the building site from the existing road located about 340 feet away. The access corridor would be staked to minimize disturbance. Also, construction personnel would be instructed to try to follow a single set of tire tracks. During operations, only occasional access to the microwave station would be required (e.g., once weekly).

3. Because of the minimal disturbance, DFG will not require any mitigation for the Mohave ground squirrel (see letter dated November 4, 1993, in Appendix B).

Bighorn Sheep

1. Potential habitat-related impacts to the bighorn sheep would either be to their food source (foraging), or to their water source. Forage is not a limiting factor for the bighorn in the area (Weaver, 1992). The quantity and quality of forage improves with elevation. The facilities

planned occur at the foot of the mountains and would not notably impact bighorn sheep foraging. Most of the bighorn use occurs above 3,000 to 6,000 feet (Weaver, 1992).

2. As discussed in Section 4.3.1.1, Redlands Spring would not be impacted by project activities. Redlands Spring would remain open and available to the bighorn sheep. Fresh water from the spring would not be used for the project.

3. ~~The b~~ Bighorn sheep ~~is~~ are known to traverse the site on occasion. The bighorn sheep may venture onto the site, particularly after closure ~~, for example,~~ when water accumulates in the mine pit after a rainstorm. Although the potential for harm to the animals would exist, bighorn sheep casualties in similar situations have been rare (Weaver, 1992).

4. Surface disturbance impacts to the bighorn sheep are not anticipated to be significant because ~~the area near~~ forage and water at Redlands Springs would not be disturbed. ~~and because the~~ Surface disturbance that would occur at the project site would not ~~substantially~~ significantly reduce available habitat for this species. ~~The habitat that is important to this species occurs at higher elevations east of the project site (Weaver, 1992).~~ Potential indirect impacts ~~of~~ to bighorn sheep from noise and human presence are discussed in Section 4.5.1.2.4.

5. The Proposed Action includes plans for monitoring impacts to bighorn sheep movement in the area as discussed in Sections 2.2.2.7.4 and 3.5.2.6.3. The NPS feels that the monitoring program is vital as discussed in their letter in Appendix G.2.

Townsend's Big-Eared Bat

1. ~~Potential h~~ Habitat-related impacts to the Townsend's big-eared bat are primarily limited to those associated with the destruction of onsite maternity roosts in the Briggs and North Briggs adits ~~disturbance of maternal roosting at the site~~. ~~Project implementation, however, would adversely impact maternal roosting, primarily occurring at the Briggs and North Briggs adits.~~ These two adits, and several other adits that receive only limited use by the Townsend's big-eared bat, are located within the planned mine pit boundary and would be excavated as a result of project implementation. The Townsend's big-eared bat, as discussed in Section 3.5, does not hibernate at the site, and the project would not affect foraging areas (Brown, 1993a).

~~2. As discussed in Section 3.5, the bats have been banded so that their activity can be monitored. Extensive studies conducted to date indicate that the bats do not winter in the adits, and that~~

~~there do appear to be acceptable alternate maternity roost sites in the vicinity. Based on results of these previous studies, Canyon has established a plan to minimize potential impacts to Townsend's big-eared bats.~~

~~3.~~2. The adits ~~to be disturbed would~~ that would be destroyed would be sealed off after a thorough search of the mine and eviction of bats present, by a qualified bat biologist. ~~fails to reveal bats. Between mid-April and the end of August, exclusion of Townsend's big-eared bats could jeopardize their reproductive success and, therefore, this time period would be avoided.~~ In the spring following sealing of the adits, ~~Canyon would conduct~~ additional surveys would be conducted to locate ~~the~~ banded bats which have been displaced by closure of the adits. ~~Once the~~ Attempts would be made to locate alternate maternity roosts. ~~are located,~~ Canyon would ~~take~~ make an efforts to protect and enhance ~~the~~ alternate roost sites, if located. The measures implemented would depend on potential constraints of the locations, including available access to the roost and ownership. ~~Based on the investigation of constraints of the locations, Canyon would implement a~~ Appropriate measures taken to protect and enhance an alternate roost site may include, but are not limited to, ~~such as~~ the installation of adit gates to exclude humans but allow wildlife access, creation of a conservation easement, or purchase of the claim. Monitoring of ~~the~~ bat populations ~~and fluctuations~~ over time would be conducted if necessary to determine the effectiveness of the mitigation measures.

~~4.~~3. As noted in Section 3.5, special temperature and humidity requirements are necessary for the maternity roosts. Potential alternate roost sites in the vicinity include Jackpot Mine, Tuber Canyon Mine, and Goldtooth Mine. As discussed in Section 3.5, it ~~also~~ appears ~~that~~ there are unknown roost sites in the vicinity of the proposed project area.

~~5.~~4. Similar mitigation for the Townsend's big-eared bat has been implemented successfully at other California mine locations including the McLaughlin Mine (Brown, 1994). Various other bat species have ~~also been~~ successfully relocated ~~by this method~~ when deterred from their roost sites. In the McLaughlin Mine bat roost relocation, a full colony of 60 Townsend's big-eared bats was successfully reestablished in 1988 and is being monitored on a regular basis.

~~6.~~5. The long-term success of reestablishing a displaced ~~relocating the~~ maternity colony ~~roosting~~ to an alternate sites would depend upon the available habitat ~~ability of surrounding areas~~ to support the displaced population. Successful maternity roost ~~locations are most likely limited by distance to an adequate water source and foraging because lactating bats cannot commute far from the roost.~~ sites are contingent upon proximity to (within one mile) a spring or riparian

habitat. Female bats must return to their young several times an evening. ~~The presence of numerous adits throughout the western flank of the southern Panamint Range, with some apparently providing adequate maternity roosting conditions, combined with historic success of this type of mitigation, indicates that relocation of maternity roosts at the site should be acceptably successful.~~ ~~The unlikely but~~ A worst-case scenario would be that the breeding population inhabiting the project site during the spring months could be ~~largely~~ lost if ~~surrounding habitat~~ a mine close to good foraging habitat cannot absorb the displaced population.

~~7.~~6. The Briggs and Jackpot Canyon maternity roosts are the only known sizable Townsend's big-eared bat maternity ~~colony~~ roosts in the ~~site~~ vicinity of the proposed project site. If ~~successful relocation of~~ the maternity colony that utilizes the project site ~~maternity colony is not favorable~~ does not successfully relocate, the impact to this species ~~of concern~~ would be considered significant. If the ~~relocated~~ maternity colony is found to successfully relocate and is documented at an alternate roost site that appears capable of supporting them ~~in perpetuity~~, and necessary measures are implemented to protect the new roost, project impacts to the Townsend's big-eared bat would be determined to have been mitigated to a level of less than significant. ~~Because of the unknown variables pending the spring effort to locate the bats,~~ Until data are collected during a spring 1995 bat survey, the project impact on this species must be considered significant. ~~pending further information.~~

Pallid Bat

1. As noted in Section 3.5.2.6.4, the lower Briggs adit was a night roost for the pallid bat. Upon sealing of this adit, the pallid bats probably moved into crevices adjacent to adits. Unlike the Townsend's big-eared bat, this bat species will use crevices as well as mines and other manmade structures. The pallid bat does not necessarily roost in large colonies.

2. Because it is not possible to locate and recover individual pallid bats within crevices, blasting and mining activities at the site will likely destroy some pallid bats. This impact would not be significant. Although declining in some areas, this bat is widespread in a variety of habitats. Adequate crevice habitat exists offsite for pallid bats. Habitat and roosting requirements for this species are not as specific as for the Townsend's big-eared bat.

Mastiff Bat

1. The project is unlikely to directly impact this bat since no known roosts occur in the vicinity of the project site. Mastiff bats heard in the area are believed to have been in transit. If individuals are killed due to project operations, the impact would not be significant. Adequate crevice habitat for this species exists in other locations.

Panamint Alligator Lizard

1. Although not observed at Redlands Spring, there is a the potential ~~that~~ for the Panamint alligator lizard ~~occupies~~ to occupy the ~~vicinity of the Redlands S~~ spring. Since the project would not impact this area, or draw water from the spring, the Proposed Action ~~would~~ is not ~~be~~ anticipated to impact this species.

Chuckwalla

1. The chuckwalla has been observed onsite and would be displaced by mining activities. It is a mobile species, utilizing rocky areas with cracks, crevices, and other cavities for escape. It is expected that the chuckwalla would move to other areas of appropriate habitat. The BLM considers the impact to this species as less than significant. Following reclamation, the mine pit and rocky slopes of the waste rock piles may provide suitable habitat for this species.

Burrowing Owl

1. As discussed in Section 3.5, a burrowing owl nesting area was observed about one-half mile from the north borrow site location near Ballarat. If the north borrow site location is used, there could be an indirect impact ~~of~~ to the breeding pair of owls, due to the temporary loss of 47 acres of potential foraging ~~area for this breeding pair of burrowing owls~~ habitat. This impact would not be significant because of its temporary nature and because 47 acres is negligible in comparison to the available similar surrounding ~~terrain.~~ habitat. ~~Also, biological productivity of the unvegetated playa surface is minimal.~~ In addition, there ~~could be~~ may be indirect impacts due to increased noise and human presence. ~~that~~ (These are discussed in Section 4.5.1.2).

~~Panamint Kangaroo Rat~~

~~1. The Panamint kangaroo rat, a BLM proposed sensitive species, was not observed during any of the numerous wildlife survey conducted on the site, nor was it captured in any of the trapping surveys for the Mohave ground squirrel. There is no indication therefore, that this species inhabits the site or would be impacted by the Proposed Action.~~

Prairie Falcon

1. ~~The p~~ Prairie falcons, ~~a state species of special concern, is~~ are known to occur within the proposed project site. ~~in the project vicinity (DFG, CNDDB, Manly Fall quadrangle). Although not observed during any of the wildlife or focused bird surveys conducted at the site, it is probable that this species could forage at the~~ site. As discussed in Section 3.5.2.6.8, prairie falcons were observed in August 1993 at the base of Manly Fall. The potential impact to this species would be less than significant ~~because of~~ due to the limited ~~acreage which~~ amount of habitat that would be impacted in comparison to ~~the~~ other remaining available nesting and foraging areas in the vicinity.

Le Conte's Thrasher

1. Direct impacts to this bird are not anticipated due to project operations. Impacts to this species, if they were to occur, would not be considered significant because of the limited habitat that would be impacted in comparison to remaining available habitat.

Ferruginous Hawk

1. The ferruginous hawk is a winter visitant to the proposed project area. Since this species does not breed in California, potential project impacts would be limited to disturbances of foraging habitat. Foraging areas for this hawk are primarily sage and juniper habitats which support small rodents (Bloom, 1995). Project impacts to forage area available to this species would be negligible.

Short -Eared Owl

1. The short-eared owl is a winter visitant to the proposed project site and utilizes Redlands Spring, upland areas (canyons and slopes above the spring), and the tamarisk trees below Manly Fall (LeBerteaux, 1989). A short-eared owl carcass was found below Manly Fall in

August 1993; the cause of death is unknown. Impacts to this species due to proposed project activities may occur. Impacts are not expected to be significant as it is a winter visitant.

Yellow Warbler

1. A primary threat to the yellow warbler is the destruction of riparian habitat. Project implementation would not impact Redlands Spring or the small areas of riparian habitat adjacent to the spring. Impacts to the species would not be significant.

Snowy Plover

1. As discussed in Section 3.5, there is potential for the snowy plover ~~has potential~~ to occur in the Panamint Valley when water is present on the playa, ~~but~~ although the plover has not been observed in Panamint Valley. These birds typically nest and feed very close to water. If one of the playa borrow sites were used, borrow activity would occur when the natural playa surface in the vicinity of the borrow site is dry. Therefore, if snowy plovers were to occur at the playa at the same time as borrow activities, loss of habitat or foraging area, if any, would be minor. Because borrow would not occur adjacent to natural playa waters, and due to the small amount of surface disturbance and short term of the borrow activities, potential surface disturbance impacts to the snowy plover would not be significant. Indirect impacts due to increased noise and human presence are discussed in Section 4.5.1.2.

Giant Fairy Shrimp

1. Giant fairy shrimp are not known to occur in Panamint Valley. ~~Therefore, n~~ No impact to this species is anticipated.

4.5.1.2 Operations-Related Impacts

4.5.1.2.1 Reagents and Processing Solution Exposure

1. The proposed heap leach process would use a weak cyanide solution to leach precious metals from ore. Ingestion of sufficient quantities of cyanide solution can result in death. Since animals seeking water could be attracted to processing solutions, if exposed, they represent a potential hazard to terrestrial and avian wildlife. Reagent-grade cyanide and other hazardous reagents would also be stored onsite and could represent a hazard to wildlife if exposed.

2. To minimize exposure of animals to cyanide solution and reagents, Canyon has incorporated several measures in the project design. Specific measures to be employed would be monitored for effectiveness in an ongoing evaluation program after commencement of operations. Measures to protect wildlife from processing solution and reagents include:

   - Floating covers would be installed on the make-up water, barren, pregnant and emergency ponds to prevent access by birds and wildlife. The detoxification pond, which normally would not contain liquid, would be netted.
   - An electrified fence would surround the heap leach pad and process pond areas to discourage entry of large mammals. The fence would be designed to minimize the potential for injury to wildlife.
   - Solution would be distributed on the heap leach pad primarily via a drip irrigation system buried at shallow depth to prevent surface ponding which could attract birds and small animals. Sprinkler application would be used on sideslopes where ponding would not occur.
   - Solution piping would prevent open solution exposure. Drain areas with exposed solution would be netted.
   - Containers of toxic reagents would be stored within controlled reagent storage areas. Containers would be kept closed or otherwise handled to prevent access by wildlife.

   These measures are expected to essentially eliminate wildlife exposure to reagents or process solutions. However, there would still be some potential for occasional incidents of isolated exposure to wildlife. Additional or improved measures would be implemented as warranted and in the future as new techniques for protecting animals from cyanide solution are developed by the mining industry.

3. Implementation of the measures set forth above would essentially eliminate wildlife exposure to cyanide solution, and therefore a significant impact is not anticipated.

4.5.1.2.2 Traffic

1. Vehicle traffic on desert roads is known to impact wildlife. Traffic impacts to wildlife are primarily due to the potential for collisions with individual animals. Degradation of habitat value adjacent to roads can also occur due to increased noise and human presence. The degree of impact is a function of various factors, including the particular wildlife species, average travel speed, road width and age, and traffic volume.

2. The increase in traffic due to the project would be short term (i.e., about eight years). Normal project traffic would be comprised of an estimated maximum of about 65 round trips daily. The associated impacts due to increased noise and human presence would not be substantial

because the increase in trips to the site is not large and would primarily occur during several short periods per day when operations shifts are changing. For most of the day, traffic along the road would be similar to current conditions.

3. The potential for frequent collisions with individuals is considered small because: (1) the portion of the travel route to the site that is highway occurs through country where roads are generally open and visibility is generally good (as opposed to areas with dense vegetation or common inclement weather); and (2) the portion of the travel route that would consist of dirt road would be designed for travel at relatively low speeds. However, some wildlife casualties can be expected due to routine transportation to and from the site.

4. If one of the playa borrow locations is used, there would also be up to seven to ten round trips per hour of haul trucks or scrapers between the borrow site and the project site for several phases of material borrow, each lasting up to about 60 working days. This would temporarily degrade wildlife habitat adjacent to the haul route and could result in some wildlife kills. A speed limit of 25 mph would be established to minimize the potential for collisions with wildlife but the large equipment would not be able to stop quickly, particularly when loaded. For the south borrow area, the haul route to the mine site would be about one-half mile long. For the north borrow area, the haul route would be about eight miles long resulting in a greater potential wildlife impact. Occasional wildlife collisions are expected to occur but not to the extent that any wildlife species in the area would be substantially diminished. Therefore, this impact is not expected to be significant.

5. The increase in traffic on Ballarat Road could indirectly affect the breeding pair of burrowing owls that were observed near the road if the increased noise or human presence causes the owls to abandon their nesting area. If any young were present in the nesting burrow at the time of abandonment, they may not be capable of survival. Also, there is some potential for direct impact due to collision with project-related vehicles. This species is uncommon and declining in Inyo County. If the project were to induce the adult owls to abandon dependent young, the impact to this species would be significant.

4.5.1.2.3 Lighting

1. The Proposed Action would require outdoor lighting. This condition would attract some animals to the area, such as bats, to feed on insects attracted to the lights. The potential impacts to nocturnal (active by night) wildlife would be similar to that for diurnal (active by day)

wildlife and would primarily be related to exposure to process solution. The potential for exposure to process solution and reagents would be minimized through measures discussed in Section 4.5.1.2.1. In addition, Canyon proposes to minimize fugitive lighting, where possible, by using directed and shielded lighting.

2. There would be no external lighting at the microwave station.

3. The effect of lighting on wildlife would not be significant because of measures to protect wildlife against harm as discussed in other parts of Section 4.5.

4.5.1.2.4 Noise and Human Presence

1. Site activities would generate noise, some of which would be of considerable intensity close to the source. Blasting would occur in the mine pits. Ore loading and hauling vehicles would create vehicle noise between the mine pits, waste rock piles, and crushing area. The crushing and conveying circuit and the electrical generating equipment would also generate noise.

2. Studies have shown that many desert wildlife species are sensitive to loud noises. Some animals, such as kangaroo rats and lizards are rendered temporarily deaf when subjected to excessive noise. This can result in increased predation of these animals by snakes and coyotes, reducing their onsite densities. In addition, project noise may interfere with animal communication noises (such as courtship and territorial vocalizations by birds). It is possible that this could locally influence reproductive success, but the few studies that have been done on this subject have been poorly designed and inconclusive.

3. Noise is attenuated by distance, atmospheric conditions, and topography, so that the primary effects of project noise would be limited to the immediate source area. The majority of noise effects are expected to be minimal more than one quarter mile away and negligible more than one mile away (Brattstrom and Bondello, 1983). No substantial effect on wildlife outside the immediate area, therefore, is expected as a result of noise. Because of the large expanse of similar habitat throughout Panamint Valley and the local nature of noise impacts, these impacts would not be significant.

4. Increased human presence in the area also has the potential to indirectly effect wildlife and habitat value. Many wildlife species prefer to avoid humans. For these species, habitat quality adjacent to areas of site activities is diminished. The character and magnitude of this

impact is expected to be similar to that discussed for noise, and is not expected to be significant for the same reasons. Some wildlife species can be indirectly attracted to human activities, leading to an upset in the local ecological system. A common reason for attraction of wildlife is intentional or unintentional introduction of food sources. In order to minimize the potential for attraction of wildlife to the site, Canyon would store garbage in closed containers. Employees would also be instructed regarding the sensitivity of the desert ecosystem and good environmental practices, including avoidance of interaction with wildlife to the extent possible.

5. As discussed in Section 4.5.1.1.1, if a playa borrow location is used, borrow activities would occur when there is no standing water on the adjacent natural playa surface. Therefore, indirect effects of noise and human presence is expected to have little or no effect on waterfowl or shorebirds, including the snowy plover if it occurs in the area. If borrow was ever to occur when any water is standing on the natural playa surface, the water would be distant from the borrow site. Although some flight response or limited displacement of animals might occur, it is anticipated that the majority of the playa, more distance from the borrow location, would be acceptably tranquil for use by wildlife. Therefore, this impact, if it were to occur, would not be significant.

6. Use of the north borrow site could indirectly affect the breeding pair of burrowing owls that were observed about one half mile from this location if the increased noise or human presence causes the owls to abandon their nesting area. If any young were present in the nesting burrow at the time of abandonment, they may not be capable of survival. Also, there is some potential for direct impact due to collision with haul vehicles, but this potential is considered to be small because the nesting area is not near the haul route. This species is uncommon and declining in Inyo County. If borrow activities were to induce the adult owls to abandon dependent young, the impact to this species would be significant.

7. Impacts of noise and human presence on the bighorn sheep are not expected to be significant because ~~the habitat that is important to the sheep begins about~~ the closest identified vital habitat for bighorn sheep is Redlands Spring, more than one-half mile east of the closest project ~~site~~ activities. ~~Much~~ Most of the noise and human presence would occur in the central portion of the site ~~about one mile~~ separated from the ~~important~~ vital bighorn sheep habitat by topography (i.e., the range front) and about one mile of distance. ~~At these distances,~~ With the distance and topographic separation, noise would be substantially attenuated. Canyon would instruct employees to not harass wildlife, and dogs or other domestic animals would not be allowed

on the site. With these measures, bighorn sheep are not expected to abandon the area. ~~(Weaver, 1992).~~ The Proposed Action includes practical mitigation measures to minimize impacts to the bighorn sheep including avoiding use of water from Redlands Spring, precautions to preclude exposure to processing reagents, and other measures as discussed in Section 4.5.4. As discussed in Section 2.2.2.7.4, the Proposed Action also includes Canyon's participation in a cooperative agency effort to monitor bighorn sheep movement in the project vicinity. If monitoring indicates that impacts to the bighorn sheep may be greater than anticipated, and that there are additional feasible mitigation measures that could reduce such impacts, BLM would require that those additional measures be implemented. Examples of additional mitigation measures that may be required by BLM include adjusting blasting schedules (e.g., during lambing season) or provision of artificial water sources (e.g., guzzlers) outside the area of influence of mine activities.

4.5.1.2.5 Ground Water Pumping

1. As discussed in Sections 4.3.1.1 and 4.4.1.1, ground water pumping for the proposed project has the potential to impact the desert sink scrub vegetation community that occurs at the playa margin. Ground water drawdown may exceed estimated normal seasonal fluctuations over an approximately 4-mile segment of the playa margin (Figure 4.3.1). This impact may reduce the habitat value of the affected desert sink scrub community. The area and degree of impact to wildlife habitat, if any, would depend upon the degree of hydraulic connection between pumped water and the shallow ground water that supports the desert sink scrub vegetation, the tolerance of vegetation species, and other factors. As discussed in Section 4.4.1.1, the desert sink scrub community is widespread throughout the region. In the vicinity of the site, the desert sink scrub community has been determined to "possess little or no ecological value" (Cedar Creek Associates, Inc., 1994), due to the very low vegetation density and extremely limited species diversity. Therefore, the potential impact to wildlife habitat due to ground water pumping would not be significant.

2. Ground water pumping could also reduce or cause a temporary cessation in flow at the intermittent seep that occurs about 1 mile north of the site near Big Horn Canyon. This seep occurs at the toe of the alluvial fan following substantial amounts of precipitation. As discussed in Section 4.3.1.1, the temporary reduction in flow, if any, would not be different than natural conditions during normal periods of lower than average rainfall. The intermittent seep occurs in the desert sink scrub vegetation community where the habitat value is low and water quality is typically poor. The potential impact to wildlife would not be significant.

4.5.2 ALTERNATIVES

4.5.2.1 No Action Alternative

1. If the No Action alternative is implemented, the Briggs Project would not occur. There would be no additional project related disturbance to creosote bush, desert sink or playa habitat. The existing surface disturbance related to the Briggs Project consisting of about 35 acres in creosote bush scrub habitat would be reclaimed. Additional direct and indirect impacts to wildlife would be avoided. Offsite mitigation would not occur.

4.5.2.2 Alternative Ore Beneficiation Rates

1. Under either the increased or decreased beneficiation rates, the final site configuration would be the same as for the Proposed Action. Therefore, there would be no difference in new habitat disturbance. However, under these alternatives, there would be no offsite mitigation so there would be a net increase in the amount of vegetated habitat that would not be restored (Table 4.4.1).

2. The slower beneficiation alternative may decrease human presence, noise and lighting levels during operations by an incremental amount, but the incremental decrease, if any, would not result in a substantive difference. The basic project components, including large trucks, loaders, dozers, blasting, and the requirement of adequate lighting for night operations would still be necessary. The degree of impact due to noise and lighting is more related to frequency, duration, peak intensity and aerial distribution than the number of sources, so the magnitude of the impacts would not be notably reduced. Traffic levels for the slower processing alternative may be slightly lower due to a decreased need for supply deliveries and possibly a few less employees. However, the traffic decrease would not be expected to exceed about 10 to 15 percent (assuming 50 percent fewer supply deliveries and about 10 percent fewer staff vehicles). Since these impacts would be extended by approximately four years compared to the Proposed Action, the overall impacts that would occur under the slower beneficiation alternative would be increased as compared to the Proposed Action.

3. The slightly increased human presence, noise and light levels associated with increasing the rate of beneficiation (by about 50 percent) would reduce the level of short-term impacts to wildlife as compared to the Proposed Action. Human presence, traffic, noise, and lighting impacts may be incrementally greater in magnitude, but would cease approximately two years earlier.

4.5.2.3 Reduced Project Size

1. The reduced project size alternative would result in approximately 100 acres less direct habitat disturbance. As discussed in Section 4.4.2.3, this alternative would result in approximately 142 acres of mine pit and waste rock pile slope area that would not be revegetated. Because there would be no offsite mitigation under this alternative, the total area where vegetated habitat would not be restored would be increased as compared to the Proposed Action (Table 4.4.1). This increase would outweigh the benefit of the approximate 100-acre reduction in temporary direct habitat disturbance. Therefore, the long-term difference for this alternative would be an increase in impact to wildlife as compared to the Proposed Action.

2. The reduced project size alternative would decrease short-term impacts to wildlife. Impacts of human presence (e.g., noise, lighting, traffic, etc.) would occur for an approximately two-year shorter project duration, and onsite activities would occur over a slightly smaller area. Also, as discussed in Section 4.3.2.3, the reduced project size alternative would result in a shortened duration of ground water withdrawal and a reduction in shallow ground water drawdown at the playa margin. This would reduce the potential to affect vegetation and associated wildlife habitat in this area. However, habitat value of vegetation at the playa margin is low, due to low vegetation cover and species diversity, so the potential reduction in wildlife habitat impact would be minor.

4.5.2.4 Balanced Waste Rock Piles

1. The balanced reconfiguration of the waste rock piles under this project alternative would not be anticipated to substantially alter the impact to wildlife as compared to the Proposed Action. Noise, and lighting, and human presence impacts to wildlife would be expected to be approximately the same as for the Proposed Action. There could be slight modifications in the amount and type of wildlife habitat to be disturbed, but the difference would not be substantial. The overall acreage of habitat disturbance would not change. As discussed in Section 4.4.2.4, there would be about 6 more acres of waste rock pile slope that would not be revegetated, but this would be offset by offsite mitigation and a reduction in the area of south-facing exposure. The reduced southerly exposure would be expected to slightly increase the potential for successful restoration of revegetated habitat on the waste rock pile benches.

2. Because Canyon has included the offsite mitigation discussed in Section 2.2.4 as part of this alternative, there would be no material difference in overall impacts to wildlife as compared to the Proposed Action.

4.5.2.5 Partial Backfilling

1. For the partial backfilling alternative, the north waste rock pile configuration would be modified to facilitate backfilling. This modified configuration would result in an increase of about 13 acres (3 percent) of temporary disturbance to wildlife habitat as compared to the Proposed Action. This additional disturbance would increase impacts to habitat during mine operations and following reclamation for a period of decades until plant species diversity and density become reestablished.

2. Under the partial backfilling alternative, about 71 additional acres of the site would be reseeded, as compared to the Proposed Action (Table 4.4.1). However, offsite mitigation would not occur, so there would be an overall increase in long-term habitat disturbance.

3. Partial backfilling would postpone completion of reclamation for about two years. Over this two-year period, there would continue to be activity at the site with the resulting impacts related to human presence, noise, etc., but at a lower level than during operations. Traffic to the site would occur during the two-year period for transportation of employees and delivery of fuel and other supplies. The impacts associated with traffic would occur at a lower level than during operations.

4. The prolonged duration of ground water withdrawal under the partial backfilling alternative (see Section 4.3.2.5) would result in an increase in the potential to affect vegetation at the playa margin. This would increase the potential for indirect impacts to wildlife utilizing that habitat. Because habitat value of the vegetation at the playa margin is low (due to low vegetation species diversity and density), this increase in impact would be minor.

4.5.3 REGULATORY REQUIREMENTS THAT LIMIT PROJECT IMPACTS

1. The potential impact to wildlife species is subject to the federal ESA which extends legal protection to animals listed as threatened or endangered or officially proposed to be listed as threatened or endangered. No federally listed, threatened or endangered species, or species

likely to become threatened or endangered in the foreseeable future, occur on the site. The FWS will review this document for ESA compliance.

2. Animals listed as threatened or endangered, as well as candidate species, are also afforded protection by the CESA as administered by the DFG.

3. The FLPMA designates wildlife development and utilization, and several another activities as principle uses of public lands, and as such, Congress has instructed BLM to manage the public lands for these uses. BLM is responsible for implementing 43 CFR 3809 regulations that prohibit "unnecessary or undue degradation" of public lands. The County is responsible for implementing SMARA. As part of the required reclamation program, site revegetation would be undertaken to reestablish wildlife habitat. The implementation and effectiveness of this program would be monitored by BLM and the County. An outline of procedures for this program is provided in Section 2.2.3.

4.5.4 MITIGATION MEASURES INCORPORATED BY PROJECT DESIGN

1. The following mitigation measures are incorporated by project design to minimize effects to wildlife:
   - Grading would be minimized to the extent practical to limit the total area of surface disturbance.
   - Site reclamation would include efforts to reestablish habitat similar to that naturally occurring at the site, including utilization of a seed mix emphasizing native shrubs.
   - Revegetation efforts would be initiated as soon as practical in areas that would not be subject to additional disturbance.
   - To reduce noise, mobile and stationary vehicles, equipment and machinery would be equipped with mufflers, as required by MSHA.
   - Prevention of solution or reagent exposure to wildlife:
     - Floating covers would be installed over the make-up water, pregnant, barren and emergency ponds. The pond covers are expected to be as effective as other available wildlife protection measures for solution storage, including enclosure in tanks. The detoxification pond, which would normally be dry, would be netted so that it would be ready for use, if needed.
     - An electrified fence would surround the heap leach pad and process pond area to discourage entry of large mammals. The fence would be designed to minimize the potential for injury to wildlife.
     - Routine distribution of solution on the top of the heap leach pad would occur via a drip irrigation system buried at shallow depth to prevent surface ponding which could attract birds and small animals.

- Solution would be transported to the ponds in closed piping to prevent open solution from attracting wildlife. Drain areas with exposed solution would be netted.

- Containers of reagents would be stored within controlled reagent storage areas and kept closed, stored in enclosed areas, or otherwise handled to prevent access by wildlife.
- No water would be extracted from the Redlands Spring, which is a resource for the bighorn sheep and other wildlife.
- Outdoor lighting for the mine pits and other areas of nighttime activities would be shielded to reduce fugitive light. The shielded lights would limit direct lighting to the area of activity, thereby reducing the potential attraction to animals.
- Disturbance to Redlands Spring, the bighorn sheep and any other wildlife, would be avoided. A wildlife education program for employees would be implemented to acquaint personnel with the procedures to be followed should wildlife be encountered. Employees would not be allowed to bring dogs or other domestic animals to the site. Employees would not be allowed to bring firearms to the site except for security personnel.
- Project waste would be properly managed at the site to control garbage that could attract wildlife.
- A program to deter Townsend's big-eared bats to alternate maternity roosts would will be implemented. The following procedure is proposed to complete this effort:
  - Adits at the site would be closed (gated or excavated) after inspection indicates no bats are inside, to force the bats to use ~~the~~ alternate roosts sites. ~~The critical period of mid-April through the end of August would be avoided.~~
  - Additional surveys would be conducted to locate alternate roosts of the banded bat colony the following spring.
  - If practical, based on land status, access, etc., security gates or other measures would be provided at the alternate roost sites as required to protect the colony from vandals.
  - Monitoring of the population and fluctuations over time would be conducted, if necessary to determine the effectiveness of the mitigation measures.
- Overland travel (without grading) will be used to gain access to the microwave station location from the existing road. The access corridor would be flagged to minimize the disturbed area.
- The microwave station will not utilize external lighting.
- Speed limit signs would be posted on Ballarat and Wingate roads to encourage travel at safe speeds.
- If one of the playa borrow locations is used, an approximately 1-foot high clay berm would be constructed around the excavation following each phase of borrow activities to prevent the excavation from draining the adjacent natural playa surface.
- If one of the playa borrow locations is used, borrow activities would occur when the natural playa surface in the vicinity of the borrow location is dry.

2. These mitigation measures would also be implemented for project alternatives, except for the No Action Alternative. For the No Action alternative, the project would not be implemented. There would be no project-related impacts or mitigation measures.

3. Mitigation incorporated by project design also includes offsite mitigation as discussed in Section 2.2.4. Canyon has volunteered to include this offsite mitigation in the balanced waste rock piles alternative. It would not occur under any of the other alternatives.

4.5.5 RESIDUAL IMPACTS

1. Implementation of the Briggs Project would incrementally reduce wildlife habitat as facilities are developed. At project completion, surface disturbance will total approximately 505 acres. About 35 of these ~~550~~ 505 acres are already disturbed. In addition to habitat disruption, there would be a reduction of habitat quality in the immediate vicinity due to this surface disturbance and project-related noise and human presence. Wildlife repopulation of the affected areas would occur following cessation of the project activities.

2. The proposed reclamation plan includes revegetation of most site disturbances. Approximately 177 acres, comprising the mine pit and waste rock pile slopes, would not be reseeded. Some plants may become established naturally on these surfaces, for example, on the mine pit benches and along fracture zones on the mine pit walls. However, substantial revegetation is not expected to occur because of the lack of a surface profile to retain moisture and allow rooting. Project-related surface disturbances would encompass up to about 135 acres of steep rocky terrain, so the net increase of this type of terrain on the project site would be about 42 acres. As discussed in Section 2.2.4, Canyon has incorporated offsite mitigation into the Proposed Action that would be designed to ~~compensate for~~ offset habitat loss due to site disturbances that are not revegetated as part of reclamation.

3. The project site does not support any threatened or endangered species. However, the bighorn sheep, a state protected species, are known to occasionally traverse the site area. ~~Because of the low frequency of use of the site, the~~ Direct impact to the bighorn sheep due to surface disturbance would be minimal. Redlands Spring and adjacent slopes that are important to the bighorn sheep would not be directly affected by the project. Indirect impacts to the sheep are not expected to be significant because of the distance between activities at the site and areas identified as important habitat for this species. As discussed in

Section 2.2.2.7, Canyon would participate in a program to monitor bighorn sheep occurrence and movement in the vicinity of the site. If monitoring indicates that project impacts are greater than expected, and that there are additional feasible mitigation measures that could reduce such impacts, BLM would require that those additional measures be implemented.

4. Destruction of ~~mine openings~~ adits used ~~for~~ as ~~maternal~~ maternity roost~~ing~~ sites by the Townsend's big-eared bat, a federal Category 2 candidate species and a state Species of Special Concern, cannot be avoided because ~~these mines occur in~~ the adits are within the mine pit area. ~~The project will displace bats in the affected shafts to other shafts in the vicinity. Proposed mitigation for the bat entails measures to minimize the potential for direct loss of animals due to excavation and protection of alternate roosting locations.~~

5. Implementation of the project would unavoidably result in the presence of processing reagents and solutions that would not otherwise be present. The project plans include extensive measures to minimize the potential for wildlife exposure to these materials. Few wildlife mortalities would be expected.

6. Project-related traffic cannot be avoided. It is anticipated that there would be approximately 65 round trips to the project site daily through the week, including deliveries and commuting site personnel, with less traffic occurring on weekends. These would also be additional traffic on Ballarat and/or Wingate roads for hauling borrow material for leach pad liner construction if one of the two possible offsite borrow locations is used. Some wildlife fatalities could be expected due to accidental collision with vehicles. Dirt roads to the project site would be traveled at low speed so frequent collisions would not be anticipated. While visibility along paved roads in the vicinity is generally good, occasional collisions could be expected due to normal highway travel speeds.

7. The potential adverse impacts of project-related noise on wildlife within the immediate project vicinity would also be unavoidable. Increased predation on small animals rendered temporarily deaf, and interference with animal communication noises could result.

8. If one of the playa borrow areas is used and shallow ground water is encountered, there may be standing water in the excavation. ~~Evaporation would result in the concentration of TDS in the water~~ The exposed ground water, if any, would be saline, so ~~that~~ it would be of little or no value to most wildlife. Additionally, even if ground water is not encountered, excavation of the playa surface could result in the occurrence of standing water being prolonged after

rains large enough to cause the berm surrounding the excavation to be overtopped. Neither of these conditions is expected to have a significant adverse effect on wildlife, but may provide some limited habitat enhancement value. Over time, the borrow excavation would fill with sediment.

9. None of the impacts to wildlife would be expected to result in substantial disturbance to threatened or endangered species, or species likely to become threatened or endangered in the foreseeable future, or substantially interfere with the movement of resident or wildlife migratory species. The loss of habitat that would occur would not be substantial because rare or unique habitats would not be affected, and considering the large amount of similar relatively undisturbed habitat in surrounding areas. Based on this criteria, the impacts that are expected to occur to wildlife are not significant.

10. ~~Although not expected,~~ It is possible that the impact to the maternity colony of Townsend's big-eared bats could be significant if the ~~relocation is not successful~~ bats do not successfully relocate. Section 4.5.1.1.2 discusses planned ~~relocation~~ mitigation procedures, the likelihood of success, and factors that could contribute to failure of the proposed measures. ~~Similar relocations of~~ The same bat species and other bat species have been known to successfully relocate at other sites where similar procedures were employed.

11. Also not expected, but possible, is a significant impact on the pair of breeding owls near the north borrow site at Ballarat Road. If project traffic or borrow activities were to cause the adult owls to abandon dependent young, the impact on this species would be significant.

4.5.6 MITIGATION MEASURES TO REDUCE RESIDUAL IMPACTS

1. If the breeding pair of burrowing owls observed near Ballarat Road were to abandon dependent young as a result of project traffic or borrow activities, the impact on this sensitive species would be considered significant. The critical season for protection of young is March through August. To provide for protection of this species, it is recommended that the following mitigation measures be implemented if the owls are found to be in the vicinity when project construction is planned to start, or when borrow activities are scheduled to occur if the north borrow area is used:
   - Use of the north borrow area should be avoided from March through August.

- Signs should be posted along the portion of Ballarat Road adjacent to the location of the owls, specifying a reduced speed limit (e.g., 20 mph) and warning drivers to be alert for avian wildlife.

While these measures could not guarantee that the owls would not be affected, implementation of these measures would reduce the potential for a significant impact to occur. Because it would mitigate a significant impact, CEQA provides the authority for these measures to be required by the County. BLM resource specialists recommend that these measures also be required as conditions of the Plan of Operations, if approved, to avoid unnecessary or undue degradation of federal lands.

2. BLM resource specialists also recommend that habitat enhancement for the Townsend's big-eared bat be required as a condition of the Plan of Operations, if approved, to mitigate impacts on this species. Habitat enhancement should be tiered based on the success of the planned bat ~~relocation~~ mitigation measures, as follows:

   - As a condition of project approval, Canyon should provide a gate to preclude undesirable human access at the Gold Tooth adit located near the Briggs Project. This is one of several adits in the vicinity that has been determined to provide potentially suitable conditions to support a maternity bat roost, as discussed in Section 4.5.1.1.2.
   - If the ~~relocation of the~~ maternity colony of big-eared bats cannot be determined to have relocated successfully, Canyon should perform habitat enhancement at one or two additional adits in the vicinity. Enhancement of two additional adits would only be required if gating of the Gold Tooth adit does not improve habitat at that location, as indicated by level of use by this species. Additional enhancement that may be required by BLM could include measures to preserve adits from disturbance (e.g., gating), and/or modifying the physical configuration of existing adits in the vicinity to provide better bat habitat (e.g., by deepening shafts or excavating caverns). Details of appropriate measures would be determined by BLM in consultation with DFG and a qualified biologist. Measures would be designed with a goal of increasing the potential big-eared bat maternity roost habitat in the southern Panamint region.

   Because these measures would reduce the potential for a significant impact to this species, CEQA provides the authority for these measures to also be required by the County.

3. The Proposed Action includes fencing the leach pad and process water pond areas to discourage access by terrestrial wildlife, use of drip irrigation, providing covers at process water ponds, and other measures to prevent wildlife exposure to processing solution and reagents. BLM resource specialists recommend a fence with a minimum height of 8 feet around all cyanide storage and use areas to effectively discourage access by bighorn sheep.

Fencing material should be chain-link, or another material acceptable to BLM, with gates where human access is required. Gates should be kept closed when not in use. CEQA does not provide the authority for these fencing specifications to be required by the County because significant impacts to bighorn sheep due to potential access to ore processing areas are not anticipated. The project design includes measures to avoid exposed solution or reagents.

4. The recommended mitigation measures discussed in this section would be applicable to the Proposed Action or any of the alternatives, except the No Action Alternative.

4.6 AIR QUALITY

1. Existing air quality at the project site would be affected by fugitive and point source emissions generated during project operations. Impacts would be considered significant if one or more of the following were to occur:
   - An ambient air quality standard is exceeded in an area of public access as a result of site activities.
   - Project emissions result in a substantial contribution to an existing or projected air quality violation.
   - There is unacceptable exposure of sensitive receptors as a result of project impacts.
   - Impacts result in a substantial effect on visibility in DVNM or in the vicinity of CLNAWS operations flight testing.

2. This section identifies the sources and quantities of emission to the air expected from project operations. Potential air quality impacts are assessed with respect to state and federal ambient air quality standards, APCD rules and regulations, and worker safety regulations. The state and federal standards are presented in Table 3.6.5. Discussion of air quality regulations is presented in Section 3.6.3.

3. The information and analyses provided herein are summarized from a detailed air impacts analysis prepared by Air Sciences, Inc., as part of the *Briggs Project Authority to Construct Permit Application*, submitted to the APCD (Air Sciences, Inc., 1994). The Authority to Construct contains background on the emission factors used and operational parameters assumed in compilation of the project air pollutant emissions inventory. The Authority to Construct application also presents the details of the air dispersion modeling analysis which estimates pollutant concentrations resulting from the Proposed Action.

4.6.1 PROPOSED ACTION

4.6.1.1 Emissions Inventory

1. The proposed project site would generate emissions to the air as a result of mining activities, ore processing operations, haul road travel, vehicular exhaust, stationary internal combustion engine exhaust, and use of leaching reagents. Increases in traffic on Ballarat and Wingate roads due to employees commuting and delivery of supplies would also result in increased emissions to the air.

2. A listing of onsite emission sources and the pollutants they would emit is presented in Table 4.6.1. Quantification of emissions from these sources is discussed in Section 4.6.1.2.

TABLE 4.6.1

ONSITE EMISSIONS SOURCES

SOURCE	EMISSION TYPE
POINT SOURCES:	
CRUSHER	
Crushing (primary, secondary, tertiary)	PM_{10}
Load/unload lime	PM_{10}
Load/unload ore	PM_{10}
Ore storage piles	PM_{10}
STATIONARY COMBUSTION SOURCES	
Generators	PM_{10}, SO_2, NO_x, CO, VOCs, NH_3
Processing equipment (propane)	PM_{10}, NO_x, CO, VOCs
FUEL TANKS	
Load/unload and storage of diesel	VOCs
Load/unload and storage of gasoline	VOCs
ASSAY LABORATORY	
Ore analysis	Lead
FUGITIVE/MOBILE EMISSIONS:	
PIT	
Drilling, blasting	PM_{10}
Load ore/waste to truck	PM_{10}
Unpaved road travel	PM_{10}
Diesel/gas vehicles	PM_{10}, SO_2, NO_x, CO, VOCs
Wind erosion	PM_{10}
Explosives	SO_2, NO_x, CO
LEACH PAD	
Load/unload ore	PM_{10}
Pad	HCN
Unpaved road travel	PM_{10}
Vehicle emissions	PM_{10}, SO_2, NO_x, CO, VOCs
WASTE PILE	
Unload waste to storage	PM_{10}
Unpaved road travel	PM_{10}
Vehicle emissions	PM_{10}, SO_2, NO_x, CO, VOCs
Wind erosion	PM_{10}
HAUL ROADS	
Unpaved road travel	PM_{10}
Vehicle emissions	PM_{10}, SO_2, NO_x, CO, VOCs

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Source: Air Sciences, Inc., 1994.

The table is divided into point source and fugitive/mobile emissions, and it identifies the sources associated with each aspect of the mine's operation (i.e., crushing, leaching, etc.). The primary sources of combustion-related emissions (NO_x, SO_2 and CO) are expected to be the four diesel-fired generators and mobile equipment. The primary sources of PM_{10} emissions are ore and waste rock handling and crushing operations, and wind erosion.

3. In addition to the emissions sources listed in Table 4.6.1 for the operational phase of the project, there would also be temporary emissions due to construction activities prior to the start up of mining operations. Construction would take approximately six to eight months for active site work. During that time, the following activities would take place:
   - Topsoil stockpiling
   - Site grading
   - Orebody prestripping
   - Leach pad construction
   - Facilities construction

4. Dust emissions (PM_{10}) from construction traffic onsite and movement/placement of earth, and emissions from combustion of diesel and gasoline (CO, NO_x, PM_{10}, and SO_2), would be the primary emissions from construction activities. Emission controls during construction would consist of watering/chemical application to haul roads, stockpiles and grading areas. The construction emissions were estimated semi-quantitatively as part of the Authority to Construct permit application, and the results indicate that construction emissions will be less than the emissions during mining. Therefore, dispersion modeling analysis was not performed for construction. The modeled impacts due to mining can serve as a maximum impacts case for construction activities.

5. Offsite sources of emissions which would increase in magnitude as a result of the project include dust and vehicle exhaust emissions along the access road to the site. Emissions from this source would increase as a result of employees using this road during their commute, and project-related deliveries.

6. Offsite emissions would also occur if one of the two possible offsite clay borrow locations is used. Offsite borrow would occur in several phases, each lasting up to about 60 working days. Associated temporary offsite emissions would include PM_{10} from fugitive dust sources, and possibly H_2S released from the disturbed playa soils (see Section 3.6.1.2 for a discussion of potential H_2S sources). PM_{10} emissions would be controlled, and it is unlikely that H_2S emissions would result in any significant impact (i.e., a nuisance impact

because of odor). Should any H_2S emissions occur which could impact health and safety during construction, measures would be taken to control these emissions (e.g., by water application) or limit exposure (e.g., by restricting operating hours).

4.6.1.2 Quantification of Emissions

4.6.1.2.1 Onsite Emissions

1. Onsite emissions due to project operations would vary throughout the project life due to mining schedules, average haul distances, and other factors. In order to ensure that potential environmental impacts are adequately characterized, emissions quantification and modeling have been performed using very conservative parameters including a maximum potential operating scenario. Because the maximum potential operating scenario may not occur, or may only occur for a short time, the calculated emission rates should be regarded as upper-bound, worst-case estimates. Actual emissions are expected to be lower.

2. Emission rates calculated for the maximum mining operations are summarized in Table 4.6.2. The table presents the controlled emissions that would occur when the measures discussed in Section 4.6.3 are implemented. Details of the emission estimates are presented in the appendices of the Authority to Construct application (Air Sciences, Inc., 1994).

3. The leaching operations associated with the project could result in minor emissions of HCN gas. Potential emissions of this pollutant would be minimized through continuous pH control of the leaching solution, such that only trace amounts of HCN gas would be generated. Control of pH is important to prevent cyanide losses through HCN formation, both as a preventive measure to protect leach pile operators from exposure to potentially unhealthful vapors, and as a means of maintaining the necessary available cyanide in the leach solution for the heap leaching process.

4. Measurements made by MSHA inspectors at other heap leach operations show that the HCN concentration in the air close to a working leach heap is consistently about 2 to 3 ppm (Bureau of Mines Information Circular 8770). This concentration is significantly less than the 10 ppm threshold limit/time-weighted average for a normal eight-hour workday established by the Occupational Safety and Health Administration (OSHA) for sustained breathing of gaseous cyanide. All necessary steps would be taken to comply with applicable MSHA regulations to protect workers from any potential occupational hazard associated with HCN. Considering the dispersion and breakdown rate of HCN, offsite air quality impacts due to HCN emissions would be negligible.

TABLE 4.6.2

SUMMARY OF DAILY AND ANNUAL EMISSIONS

SOURCE CATEGORY	PM_{10}		NO_x		CO		SO_2		VOCs		HCN		Lead		NH_3	
	Daily (lb/day)[1]	Annual (tpy)[2]	Daily (lb/day)	Annual (tpy)[2]	Daily (lb/day)	Annual (tpy)[2]	Daily (lb/day)	Annual (tpy)[2]	Daily (lb/day)	Annual (tpy)[2]	Daily (lb/day)	Annual (tpy)[2]	Daily (lb/day)	Annual (tpy)[2]	Daily (lb/day)	Annual (tpy)[2]
Point Source[3]	179	23	380	69	1,110	203	54	10	39	7	--	--	3	0.4	40	7.2
Mobile	75	10	1,232	162	516	67	31	4	70	9	--	--	--	--	--	--
Fugitive	2,148	264	212	27	834	105	25	3	2	0.4	145	26	--	--	--	--
TOTAL[3]	2,402	297	1,824	258	2,460	375	110	17	111	16.4	145	26	3	0.4	40	7.2

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Source: Air Sciences, Inc., 1994.

(1) lb/day = pounds per day.

(2) Annual emissions are calculated considering varying activity rates for individual processes and, therefore, are not 365 times higher than the daily emission rates.

(3) The 250 ton per year emission trigger level for PSD regulation of gold mining facilities applies to point sources, and not to total site emissions.

-- = zero or negligible emissions of this pollutant for the source group.

5. Ammonia (NH_3) emissions would be generated as a result of the emissions control measures that will be applied to the generators. The control technology used for the generators is SCR in combination with timing retard. Ammonia is used in SCR to reduce NO_x to molecular nitrogen. As a result of the design of SCR systems, it is typical for a small amount of ammonia to slip through the process. The ammonia slippage results in emissions to the air.

4.6.1.2.2 Potential Offsite Emissions

Routine Access Road Traffic

1. The emissions expected due to increased traffic on the access road can be estimated based on projected traffic conditions and site specific conditions on the road. The access road is unpaved, and begins at Trona-Wildrose Road west of Ballarat. The access road length between Trona-Wildrose Road and the project site is approximately 12 miles. The road continues past the project site for another approximately 20 miles where it connects to another paved road that leads west to CLNAWS. There is no through traffic on the access road because access is restricted through the CLNAWS that abuts the southernmost end of Panamint Valley.

2. Existing traffic on the access road is minimal, and has been estimated to be less than 25 cars per day (Air Sciences, Inc., 1994). As indicated in Table 2.7, the maximum estimated project-related weekday ~~daily~~ traffic on the road would consist of approximately 120 ~~60~~ one-way trips by passenger vehicles, and five round trips by delivery vehicles bringing fuel, lime, chemicals, etc. Deliveries would be spread throughout the day. Travel by passenger vehicles would primarily occur during shift changes, with the maximum traffic occurring as the day shift leaves the site and the swing shift arrives onsite.

3. The primary impact from this increase in traffic would be increases in PM_{10} concentrations due to dust stirred up by the moving vehicles. Because of the relatively small number of vehicle trips, exhaust emissions would have a negligible impact on ambient air quality. Emissions of PM_{10} have been estimated using the methodology presented in EPA (1985). The results of the calculations are presented in Table 4.6.3.

TABLE 4.6.3

ACCESS ROAD PM_{10} EMISSIONS

TRAFFIC COMPONENT	EMISSIONS[1]
COMMUTER VEHICLES~~(2)~~	
Maximum Hourly(2)	180 lb/mile/hr
~~Daily Average~~ Weekday Maximum(2)	360 lb/mile/day
Annual Average(3)	220 lb/mile/day
DELIVERY VEHICLES~~(3)~~	
Maximum Hourly(4)	90 lb/mile/hr
~~Daily Average~~ Weekday Maximum(4)	240 lb/mile/day
Annual Average(3)	190 lb/mile/day
MAXIMUM HOURLY (Worst Case)	180 lb/mile/hr
~~DAILY AVERAGE~~ WEEKDAY MAXIMUM (Commuter Plus Deliveries)	600 lb/mile/day
Annual Average(3)	410 lb/mile/day

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(1) Emissions for any one mile length of the 12-mile stretch of unpaved road. Calculated using Equation 1 on page 11.2.2-1 of AP-42 Compilation of Air Pollution Emission Factors (EPA, 1985).

(2) Assumes a maximum of 60 one-way trips during any one-hour period, and a maximum of 120 one-way trips per day.

(3) Based on average traffic in Table 2.7.

~~(3)~~ (4) Assumes a maximum of two tractor-trailer rigs (18-wheelers) arriving during a one-hour period. Weekday maximum ~~Daily average~~ assumes two round trips for deliveries with tractor/trailer rigs and three round trips for light (six-wheel) supply trucks.

Potential Offsite Borrow Activities

1. Offsite emissions due to borrow activities would occur if one of the playa locations is used to obtain clay for leach pad construction. The primary emission from these activities would be PM_{10}. The exhaust emissions from the haul trucks and the excavation equipment would not be significant. Minor emissions of H_2S from soil excavation may also occur but are unlikely to cause a noticeable air quality impact. The maximum expected impact from H_2S would be minor odor in the immediate vicinity of the active excavation.

2. Emissions of PM_{10} associated with clay borrow activities would result from two general sources: (1) the excavation and loading activity at the borrow site; and (2) emissions from the haul trucks traveling over the unpaved roads. Emissions from both of these sources have been estimated using methodology and emission factors presented in EPA (1985).

3. As discussed in Section 2.2.2.5.6, the total area of disturbance would be approximately 47 acres; however, it is estimated that only about 1 acre of the borrow area would be active at any given time. The borrow activities would take place in several (up to three) phases, each lasting approximately 50 to 60 working days. Each phase of construction would be separated by a period of several months to a couple of years. Using an emission factor of 1.2 tons of uncontrolled particulate emissions per acre of construction per month of activity (EPA, 1985), and an active area of about 1 acre at any given time, the estimated emissions are approximately 3 tons of particulate matter per phase. Assuming 30 days per month and seven days per week of excavation, this is equivalent to approximately 80 pounds per day. To be conservative, it is assumed for the purpose of this analysis that all of the particulate matter is PM_{10}.

4. APCD regulations require reasonable efforts to reduce fugitive dust emissions. An emissions control program would be a part of the excavation activities. Watering of the active areas would occur as necessary to control emissions. This control measure typically results in approximately 70 percent reduction in emissions (AWMA, 1992). Greater reductions in emissions can be achieved using a more intensive watering plan (i.e., by watering more frequently and with a higher application rate). Based on the 70 percent control factor, PM_{10} emissions from the excavation activities would be less than 25 pounds per day.

5. Emissions from the hauling of the clay materials to the heap leach pad site is dependent on the distance of the haul. The emissions per vehicle for every mile of road (vehicle-mile) would be similar to that for the heavy delivery vehicles using the access road. This is equivalent to approximately 45 pounds per vehicle-mile. As with excavation emissions, an emissions

control program is required by the APCD. The road would be watered, with application of additional dust palliatives if necessary. With a 70 percent control efficiency, the controlled emission rate is estimated to be approximately 13 pounds per vehicle per mile. As discussed in Section 2.2.2.5, the estimated number of vehicle trips per hour is approximately seven to ten. Therefore, estimated hourly PM_{10} emissions are expected to be about 90 to 130 pounds per mile of road.

6. Two offsite borrow areas are being considered. The locations of these borrow areas are presented in Figure 2.20. The south borrow area would require a haul distance of less than one mile. The north borrow area would require a haul of approximately nine miles. Total dust emissions over the length of the respective hauls would be in direct proportion to these haul distances.

4.6.1.2.3 PM_{10} Emissions During Periods of High Wind Speed

1. Wind speed and wind direction significantly affect particulate emissions from surface mining operations and also influence baseline (background) levels of PM_{10}. The APCD recognizes that maximum baseline concentrations of PM_{10} occur under high wind speed conditions. The APCD also recognizes that many of the PM_{10} sources at the project site have emission rates that are wind speed-dependent. Therefore, in addition to the analysis of PM_{10} impacts that is based on average wind speed and actual meteorological conditions, the applicant has prepared an analysis of short-term (24-hour) impacts created by high speed winds. Emission rates for this high wind speed analysis are based on emission factors using a 20 mph wind speed.

2. The emissions sources that are wind speed-dependent are listed in Table 4.6.4. High speed wind increases the emission rates of the six sources listed in Table 4.6.4 by approximately 350 percent. As a result, the total PM_{10} emissions rate during high speed wind is approximately 160 percent higher than average emissions.

3. The daily emission rate shown for high speed wind conditions in Table 4.6.4 is conservative (high) because the emissions shown are based on a wind speed of 20 mph for the entire day. Meteorological monitoring data for the site indicated there were no days where the average wind speed was as high as 20 mph. In fact, 20 mph winds were persistent for only a few hours during any 24-hour period (Air Sciences Inc., 1993).

TABLE 4.6.4

HIGH WIND VERSUS AVERAGE WIND PARTICULATE EMISSIONS

SOURCE	SOURCE CATEGORY[1]	DAILY EMISSION RATE (lbs/day)	
		High Wind Conditions (20 mph)	Average Conditions (6.3 mph)
WIND SPEED-DEPENDENT SOURCES			
Load ore to hopper	P	82	18
Load mined ore to truck	F	898	200
Unload mined ore to stockpile	F	898	200
Convey ore to leach pad	F	199	44
Load pit waste to truck	F	1,466	326
Unload waste to storage	F	1,466	326
TOTAL WIND SPEED-DEPENDENT EMISSIONS[2]		5,010	1,120
TOTAL PM_{10} EMISSIONS[2][3]		6,300	2,400

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Source: Air Sciences, Inc., 1994.

(1) P = Point source; F = Fugitive source.

(2) Totals may not add due to independent rounding.

(3) Includes PM_{10} emissions from all sources. Sources whose emissions are unaffected by wind speeds are not listed in the table but are included in this total.

4.6.1.3 Air Quality Impact Analysis

1. This section summarizes the analysis used to estimate the potential air quality impacts that could result from the Proposed Action, and compares the estimated impacts with significance criteria. Potential impacts are estimated using results of air dispersion modeling based on the maximum potential operating scenario, as discussed in Section 4.6.1.2.1. For most of the project life, emissions are expected to be substantially less than indicated by this modeling.

4.6.1.3.1 Impact Analysis

1. Based on the estimated emissions discussed in Section 4.6.1.2 and presented in Table 4.6.2, impacts due to volatile organic compounds (VOCs), HCN, lead and NH_3 emissions would be extremely small, and therefore, cause no concern for violation of standards. Because of the minor nature of these emissions, dispersion modeling is not required. Dispersion modeling has been performed for NO_x, PM_{10}, CO and SO_2 to support Canyon's Authority to Construct permit application to the APCD.

2. Dispersion modeling was performed according to a protocol approved by the APCD, and follows guidelines for air dispersion modeling established by the EPA. This includes using a complex terrain model to determine impacts in areas where the terrain exceeds the elevation of the emission point, and a simple terrain model for all other areas. The site-specific meteorological data (discussed in Section 3.6) were used to simulate mixed layer depth (which is related to temperature inversions), wind speed, wind direction, and stability conditions. In addition, the impacts for high speed wind conditions were analyzed.

3. Impacts are determined with the models by calculating contributions of each modeled source, and then adding them to get the total project impact. The maximum project impact among the receptor points modeled is then added to the baseline concentration to determine the overall impact. The receptor points for the modeling analysis were located along and outside the project boundaries.

4. For air quality impact evaluations, the sum of modeled and baseline concentrations at the closest point of public access is compared to the appropriate air quality standard. For the Briggs Project, access in the vicinity of the eastern part of the project, adjacent to the mine pit and waste rock dumps, is severely limited by the steep natural topography. On the more gentle slopes of the fan surface, the potential access limits north of the site were modeled along the closest

east-west receptor grid outside of the project boundary. Due to grid spacing and project boundary orientation, this grid line occurs from 200 to 500 meters north of the project boundary. Along the west side of the project, access limits are considered to be coincident with Wingate Road. Along the southern portion of the site, access limits are considered to be generally south of the location where the project boundary diverges from Wingate Road, and subparalleling the ground surface contours. The maximum estimated emission concentrations at locations of public access adjacent to the site are presented in Table 4.6.5. Also included are the baseline concentrations of each pollutant (if available).

5. As shown in Table 4.6.5, the sum of baseline and maximum project impact concentrations of NO_x, SO_2, and CO are below the state and federal ambient air quality standards. Total PM_{10} concentrations are below federal standards and below the annual average California PM_{10} standard. The California PM_{10} standard for a 24-hour average was exceeded for both the average case and the high speed wind case.

6. It is important to note that in the assessment of PM_{10} impacts during high speed wind conditions, baseline PM_{10} concentrations measured at the site represent approximately 86 percent of the California standard. In addition, the high speed wind conditions which were used to calculate emissions (wind speeds greater than 20 mph) are infrequent (expected to occur about 3 percent of the time), and do not occur over an entire day.

7. The maximum predicted PM_{10} impact under the high speed wind condition is lower than the maximum for normal conditions, as presented in Table 4.6.5. This is due to several factors. As mentioned in Section 3.6, high wind speeds occur during periods of neutral stability, which promotes better mixing and dispersion than low wind speeds in stable conditions. In addition, high wind speeds have a diluting effect on emissions from point, area, and volume sources.

8. Based on the significance criteria identified and the results of modeling, the PM_{10} concentrations greater than the California 24-hour standard would be a significant impact. While this standard may be exceeded on occasion, actual impacts would probably be substantially lower than indicated by the modeling results shown in Table 4.6.5, due to the conservative nature of the modeling. For interpreting the results provided in Table 4.6.5, the following points are important to consider:

   - Emissions of PM_{10} which are input to the model are based on a maximum emissions scenario. As discussed earlier, this maximum emissions scenario may not occur, or may occur only for a short period.

TABLE 4.6.5

MAXIMUM ESTIMATED EMISSIONS IMPACT PLUS BASELINE CONCENTRATIONS

POLLUTANT	AVERAGING INCREMENT	MAXIMUM IMPACT ($\mu g/m^3$)	BASELINE ($\mu g/m^3$)	TOTAL CONCENTRATION ($\mu g/m^3$)	LOCATION	NAAQS ($\mu g/m^3$)	CALIFORNIA AMBIENT ($\mu g/m^3$)
PM_{10}	24-Hour	107	29.0(1)	136	S of pit	150	50
	24-Hour(2)	93	43.0	136	S of pit	150	50
	Annual(3)	15(3)(4)	12.5(3)	27.5	NW of pit	–	30(3)
	Annual(5)	18.8(5)	16.0(5)	34.8	NW of pit	50	–
SO_2	1-Hour	18.4	NA	18.4	NW of pit	–	655
	3-Hour	13.1	NA	13.1	S of pit	1,300	–
	24-Hour	3.1	NA	3.1	NW of pit	365	105
	Annual	0.88	NA	0.88	NW of pit	80	–
NO_x	1-Hour	458	NA	458	NW of pit	–	470
	Annual	22	NA	22	NW of pit	100	–
CO	1-Hour	453	NA	453	NW of pit	40,000	23,000
	8-Hour	172	NA	172	S of pit	10,000	10,000

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Source: Air Sciences, Inc., 1994.

(1) Maximum 24-hour baseline concentration after eliminating ten high speed wind days.
(2) High speed wind case.
(3) Geometric mean.
(4) Estimated assuming $\frac{\text{Geometric mean}}{\text{Arithmetic mean}} = 0.75$, based on comparison of mean baseline concentrations.
(5) One year arithmetic mean.

NA = Data not available.

- Maximum model-predicted impacts occur during days when the wind speed and atmospheric mixing is low. These conditions are mutually exclusive of conditions that promote high baseline concentrations and high emissions. As noted in Section 3.6, baseline concentrations during low speed wind conditions are generally less than 6 $\mu g/m^3$, approximately one-fifth of the baseline concentration used in the impacts analysis.
- ~~Exceedances of the California 24-hour PM_{10} standard are common in desert basins and dry foothills areas.~~
- The methodology for estimating fugitive emissions of PM_{10} is much less accurate than that used for predicting other emissions and is very conservative. The conservative estimates are compounded by conservative dispersion assumptions.
- The dispersion models predict pollutant concentrations assuming the pollutant behaves as a nonreactive gas. PM_{10} is a suspended solid. Unlike a gas, PM_{10} will settle out of the air. This is particularly true of mineral particles such as the dust which would be emitted from the Briggs Project because mineral particles are generally larger and heavier than PM_{10} particles from other sources, such as combustion. Settling of particles will reduce their transport and reduce the respective offsite concentrations.

9. It is also important to consider that the California 24-hour PM_{10} standard would only be exceeded due to onsite activities in the immediate area of the site. The modeled impact is largely due to the fact that earthmoving activities would occur very close to the site boundary as a result of the site being constrained by the surrounding WSA. In addition, even with the conservative emissions estimates and modeling techniques used, results indicate that PM_{10} levels would be less than the health-based primary NAAQS, which includes a margin of safety.

4.6.1.3.2 Project-Related Air Quality Impacts From Offsite Sources

Routine Access Road Traffic

1. As discussed previously, traffic along the unpaved access road would increase as a result of the Briggs Project. As discussed in Section 4.6.1.2., increased traffic along the unpaved road would result in an increase in dust emissions along the road. The increases in automobile exhaust emissions due to the increase in traffic would be negligible compared to the air quality standards and would not result in a significant air quality impact.

2. Because the primary dust source along the road would be associated with a commute schedule, the increases would be concentrated at times of shift-changes. Elevated PM_{10} emissions during these short periods of more concentrated traffic would be likely to cause the California 24-hour standard, and possibly the federal standard, to be exceeded near the road. This impact would be significant; but would be localized and short in duration. Because of the rural nature of the area, there would be few potential receptors.

Potential Offsite Borrow Activities

1. If the source of fine grained material for leach pad construction is located offsite, then there would also be an increase in offsite exhaust and PM_{10} emissions due to excavation activities at the borrow area and additional traffic from hauling the material. Exhaust emissions would be minor and would not result in a significant impact.

2. There is a potential for emissions of H_2S from an offsite borrow area due to release of this compound from soil gas during excavation. However, H_2S emissions, if any, are expected to be low. If these emissions are of such a magnitude to cause a concern of worker health and safety, measures would be taken to reduce worker exposure.

3. ~~Although the fugitive dust emissions would be controlled as required by the APCD, it is likely that PM_{10} emissions would cause the California 24-hour standard to be exceeded in the immediate vicinity of the borrow area and along the road. This impact would be significant; but localized and short in duration.~~ Borrow would occur in several phases lasting about 60 days each. Geotechnical testing has shown the clay soils at the playa to have a high moisture content that would limit dust generation. Emissions from the clay borrow excavation and the haul road would be further controlled by watering and application of palliatives as necessary, to maintain dust levels within applicable standards.

~~4. Finally, although the significance criteria may be exceeded by these two offsite sources of fugitive dust, the potential for human health impacts is low because of the distance to any receptor populations and the fact that the federal PM_{10} standard, which is based on human health protection, is not likely to be exceeded.~~

~~5.~~ 4. Total PM_{10} emissions that could occur due to project implementation are summarized in Table 4.6.6.

4.6.1.3.3 Visibility Impacts

1. Visibility has been identified an important resource due to the proximity of DVNM and CLNAWS. As discussed in Section 3.6.1.3, the project site is located in an area of very good visibility. Visibility degradation that could occur due to the project has been assessed in terms of change in visual range, which is defined as the furthest distance an observer can recognize objects such as mountain ridges, and clouds.

TABLE 4.6.6

SUMMARY OF TOTAL ESTIMATED PM_{10} EMISSIONS

SOURCE	YEARS WHEN LEACH PAD CONSTRUCTION OCCURS (tons per year)	YEARS WHEN NO LEACH PAD CONSTRUCTION OCCURS (tons per year)
Onsite Point Sources(1)	23	23
Onsite Mobile Sources	10	10
Onsite Fugitive Sources	264(2)	264
Site Access Road Traffic	900 ~~1,000~~(3,4)	900 ~~1,000~~(3,4)
Clay Borrow Excavation	0.75(5)	--
Clay Hauling	560(6)	--
TOTAL(1)	**1,760 ~~1,860~~(4)**	**1,200 ~~1,300~~(4)**

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(1) The 250 ton per year emission trigger level for PSD regulation of gold mining operations applies only to point sources.

(2) Does not include borrow excavation if clay borrow is obtained onsite.

(3) Based on 12 miles of road, and the annual average emissions from Table 4.6.3. ~~with 100 percent of Table 4.6.3 emissions 260 days per year, and 25 percent of Table 4.6.3 emissions 90 days per year.~~

(4) Recommended mitigation measures for reducing dust emissions from the project access road, discussed in Section 4.6.6, would reduce PM_{10} emissions by an estimated 810 ~~900~~ tons per year below the emissions shown.

(5) Based on an emission rate of 25 pounds per day, 60 days per year, as discussed in Section 4.6.1.2.2.

(6) Estimate reflects maximum emissions scenario, which would occur only if the north borrow area is used. Estimate is based on an emission rate of 130 pounds per hour, per mile of road, with a haul distance of 9 miles, and 16 hours of hauling per day for 60 days per year.

2. The potential for visibility degradation was assessed using the EPA screening models VISCREEN (Version 88341) and PLUVUE-II (Version 92243). Both of these models calculate dispersion of particulate, NO_x and SO_2 emissions, and relate the concentrations of these constituents to visibility impairment. VISCREEN calculates the magnitude of visibility impact that would be exceeded approximately one day per year based on a reasonable worst-case scenario. PLUVUE is a more refined model that predicts the effects of transport, dispersion, chemical reactions, optical effects and surface deposition of emissions on visual range and other visibility-related parameters.

3. Application of these models to the Briggs Project is very conservative. They are designed for emissions from a single stack. Considering the project sources of emissions are spread over the entire site, modeling of these emissions as a single narrow plume from one stack considerably overestimates visibility degradation.

4. The visibility analyses and model run outputs are presented in detail in the Authority to Construct permit application for the Briggs Project (Air Sciences Inc., 1994).

5. CLNAWS encompasses areas to both the west and south of the project site (Figure 3.6.1). The parcel of CLNAWS to the west of the site is located beyond the Slate Range and Searles Valley. DVNM is also outside the Panamint Valley, with the boundary occurring along the ridgeline of the Panamint Range, generally 4,000 to 9,000 feet or more above the project site. To affect either of these areas, winds would have to carry project emissions a considerable distance over variable topography. The windrose for the site (Figure 3.6.2) shows that the winds in the area move predominantly along the valley axis. Winds blowing toward DVNM or the western parcel of CLNAWS occur infrequently and only under neutral and unstable conditions (which result in moderate to good mixing and dispersion). Results of initial visibility impact screening using the VISCREEN model indicate that there would be no significant degradation of visual range in any portion of DVNM or the western parcel of CLNAWS under any solar angle or atmospheric condition that would be expected.

6. The southern parcel of CLNAWS begins south of the project site, at the southernmost end of Panamint Valley. The wind blows from the project site toward this area approximately 17 percent of the time, as shown in Figure 3.6.2. Because a portion of this parcel is within Panamint Valley and onsite wind data indicated potential for this sensitive area to be affected, the more refined PLUVUE model was used. The potential for visual range reduction was assessed by focusing on the occurrence of stable conditions with low speed winds blowing

toward the south. Stable conditions with low wind speeds would result in maximum visibility impacts. Review of onsite meteorological data indicates that stable conditions with low wind speeds which are sufficiently persistent to carry project emissions to this portion of CLNAWS are infrequent. There were only four occurrences of such conditions in the one-year data set. All of these instances occurred at night, and conditions changed within one hour of the time required for the emissions to travel into CLNAWS.

7. Results of modeling for the southern parcel of CLNAWS are summarized in Table 4.6.7. The results reflect the proximal portion of the area that is within Panamint Valley. The maximum visibility degradation estimated by the model, which would occur for stable conditions, is about 9 percent. Based on the one year of meteorological data collected at the site, this would occur for about an hour at night about four times a year. Under neutral and unstable conditions, maximum visual range reductions would be approximately 4 percent and 0.5 percent, respectively. Visual degradation would be less for the majority of the southern parcel of CLNAWS, which is located outside of Panamint Valley. Because of the relatively low magnitude of visual degradation, the limited area that may be measurably affected, and the infrequent nature of occurrences, impacts to CLNAWS would not be significant.

8. Visibility impacts in the immediate vicinity of the project site were also assessed. At locations within 1 kilometer (about 0.6 mile) of the site, under neutral stability and 12 mph wind speed, the VISCREEN model predicts that there would be visibility degradation for viewing angles within about 20 degrees of looking directly into the sun. This potential visibility degradation would be adjacent to the source (restricted to within a few kilometers of the project), outside DVNM and CLNAWS. Because of the limited distance from the site for which visibility would be affected, a significant impact to military flight operations in Panamint Valley or wilderness qualities in adjacent areas is not anticipated.

4.6.1.3.4 Potential Air Quality Impacts to Wilderness and Park Lands Proposed Under The Desert Protection Act

1. As discussed in Section 3.7, a portion of the Manly Peak WSA is proposed as wilderness under the DPA. The currently proposed wilderness boundary would begin about one mile east of the project site. Other more distal areas of the Panamint Valley would also be designated as wilderness as discussed in Section 3.7. Wilderness areas over 10,000 acres in size could become Class I areas under the PSD program of the Clean Air Act. The DPA, if passed in its current form, would also move the boundary of DVNM about one mile west

TABLE 4.6.7

PLUVUE MODEL RESULTS
SOUTHERN CLNAWS PARCEL

STABILITY CONDITION	WIND SPEED (mph)	VISUAL RANGE REDUCTION(1) (%)
Stable	9	9
Neutral	9	3.9
Unstable	6.7	0.5

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Source: Air Sciences Inc., 1994.

(1) Representative visual range reduction for the northern portion of the southern CLNAWS parcel that is within Panamint Valley. For the majority of the parcel, visual range reduction would be less.

(to within approximately 2.5 miles from the site), and change its status to national park. Death Valley National Park could also become a Class I area. Currently, the closest Class I area is more than 50 miles from the site in the Sierra Nevada Range.

2. Allowable air quality impacts in Class I areas are much more limited than for other areas. Impacts are controlled by limiting large sources of emissions which are subject to PSD requirements. Because the Briggs Project would not emit a high enough level of emissions to trigger PSD requirements, the Class I designation would not change the air quality analysis discussed in this document. The NAAQS and CAAQS are the same in all area classifications.

3. The proposed wilderness areas and Death Valley National Park would be beyond the range of significant air quality impacts. In addition, the results of the visibility impacts analysis demonstrate that potential visibility degradation due to project emissions would be minor. Therefore, the proposed park and wilderness areas would not be significantly affected due to emissions from the Briggs Project.

4.6.2 ALTERNATIVES

4.6.2.1 No Action Alternative

1. The No Action Alternative would result in no project-related air quality impact. Air quality and visibility in the vicinity would remain unchanged as the project does not displace or mitigate existing sources of emissions.

4.6.2.2 Alternative Ore Beneficiation Rates

1. The alternative action of increasing the rate of mining by 50 percent would result in greater short-term and annual impacts than the Proposed Action, although the duration of the project would be decreased. Because the impacts analysis for the Proposed Action was performed for a maximum operations scenario, and because of other operational considerations, the increase in emissions for the faster beneficiation rate would not be 50 percent higher than estimated emissions for the Proposed Action.

2. There are two ways to achieve a 50 percent increase in operating rate for the project: (1) increase the number of hours per day and days per week that ore is mined; or (2) increase the number or size of material handling and processing facilities (e.g., haul trucks, crushers,

etc.) to handle an hourly processing rate which is higher. If the increased beneficiation rate alternative were to be implemented, it most likely would include a combination of these methods applied to different areas of the operation.

3. If it is conservatively assumed that increasing the processing rate by 50 percent results in an increase in the model-predicted maximum project impacts in Table 4.6.5 by 50 percent, then this alternative would cause exceedance of federal and state air quality standards for PM_{10} and the state standard for NO_x. A more detailed analysis would demonstrate that the increase in maximum project impact is somewhat lower since not all emissions are activity rate dependent. Increased project impacts for this alternative are more likely to be in the range of 20 to 40 percent higher than those for the Proposed Action. However, even these increases would result in exceedance of NAAQS and CAAQS for PM_{10} and the CAAQS for NO_x. Visibility impacts at DVNM and CLNAWS due to the increased beneficiation rate alternative would increase incrementally over the impacts for the Proposed Action. In the immediate vicinity of the project, increases in visibility impacts would be of a magnitude similar to increases in the other air quality parameters discussed above. With the increased beneficiation rate alternative, the duration of air quality impacts would be about two years shorter.

4. The alternative action of reducing the processing rate by 50 percent would reduce the operating rate or daily operations schedule which would result in a reduction of emissions, and consequently a reduction of predicted impacts. This alternative would also result in extending the project life (and the duration of air quality impacts) by approximately four years. Because of various operational factors, the reduction in predicted concentrations would not be directly proportional to the concentrations estimated for the Proposed Action. A 50 percent reduction in activity dependent emissions would likely result in a reduction of project impacts by approximately 20 percent to 40 percent. Although PM_{10} emissions may be reduced by up to 40 percent, it is likely that the California 24-hour PM_{10} standard would still be exceeded. However, the amount that the standard would be exceeded by would be substantially less. The primary reasons for the exceedance of the California 24-hour PM_{10} standard are the high background concentrations and the close proximity of mining activities to the site boundary due to area constraints imposed by the surrounding WSAs. These conditions would not change for the reduced ore processing rate.

4.6.2.3 Reduced Project Size

1. The proposed alternative involving reduction of the total amount of ore processed by 30 percent would result in air quality and regional visibility impacts similar to the Proposed Action since operating rates would be the same. However, because the period of the mining would decrease by approximately 30 percent, the duration of the projected impacts would be shorter.

4.6.2.4 Balanced Waste Rock Piles

1. The proposed balanced waste rock pile alternative would be expected to result in slightly lower emissions than the Proposed Action. The sizes and shapes of the waste rock piles would be optimized to reduce haul road length, which would reduce the total amount of dust and fuel-burning emissions. This alternative could occur only if the WSA boundaries are removed.

2. Table 4.6.8 shows the estimated emissions impacts for the balanced waste rock pile alternative, which were also modeled for the Authority to Construct permit application. As can be seen by comparison with Table 4.6.5, the reduction in total quantity of emissions would not materially reduce emission concentrations at points of potential public exposure, although the location of maximum concentrations would change.

4.6.2.5 Partial Backfilling

1. For construction and operation of the project, the partial backfilling alternative would be the same as the Proposed Action and, therefore, would have the same air quality impacts for most of the project duration. The primary difference in air quality impacts of this alternative as compared to the Proposed Action would be the prolonged air quality impacts (by about two years), due to dust and fuel burning emissions of backfilling.

2. The most substantial emissions of the Briggs Project would be PM_{10} and NO_x. Other emissions are minor in quantity or in comparison to applicable standards. The primary sources of PM_{10} are earthmoving activities and wind erosion from active earthmoving areas. Maximum PM_{10} emissions due to backfilling would be about 85 percent of the PM_{10} emissions that would occur during operations. The reduction in emission would be due to the fact that ore crushing, drilling, blasting and other PM_{10} generating activities would not be required, and the average haul distance for backfilling would be less than the haul distance during operations. The estimated NO_x emissions during backfilling would be about

TABLE 4.6.8

BALANCED WASTE ROCK PILES ALTERNATIVE MAXIMUM ESTIMATED EMISSIONS IMPACT PLUS BASELINE CONCENTRATIONS

POLLUTANT	AVERAGING INCREMENT	MAXIMUM IMPACT ($\mu g/m^3$)	BASELINE ($\mu g/m^3$)	TOTAL CONCENTRATION ($\mu g/m^3$)	LOCATION	NAAQS ($\mu g/m^3$)	CALIFORNIA AMBIENT ($\mu g/m^3$)
PM_{10}	24-Hour	106	29.0(1)	135	SW of pit	150	50
	24-Hour(2)	91.5	43.0	134	SSW of pit	150	50
	Annual(3)	15.6(3)(4)	12.5(3)	28.1	SSW of pit	--	30(3)
	Annual(5)	19.5(5)	16.0(5)	35.5	SSW of pit	50	--
SO_2	1-Hour	20.5	NA	20.5	SSW of pit	--	655
	3-Hour	13.1	NA	13.1	SSW of pit	1,300	--
	24-Hour	3.0	NA	3	SSW of pit	365	105
	Annual	0.8	NA	0.8	SSW of pit	80	--
NO_x	1-Hour	460	NA	460	SSW of pit	--	470
	Annual	19.6	NA	19.6	SSW of pit	100	--
CO	1-Hour	501	NA	501	SSW of pit	40,000	23,000
	8-Hour	171	NA	171	SW of pit	10,000	10,000

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Source: Air Sciences, Inc., 1994.

(1) Maximum 24-hour baseline concentration after eliminating ten high speed wind days.
(2) High speed wind case.
(3) Geometric mean.
(4) Estimated assuming $\frac{\text{Geometric mean}}{\text{Arithmetic mean}} = 0.75$, based on comparison of mean baseline concentrations.
(5) 1 year arithmetic mean.

NA = Data not available.

60 percent of NO_x emissions that would occur during project operations. NO_x would be generated by fuel burning emissions of earthmoving equipment and some power generation (assumed to be about 20 percent of operational phase power needs).

3. Based on these estimates, NO_x emissions from backfilling would be much less than applicable standards, but PM_{10} emissions would be significant. Exceedances of the California 24-hour PM_{10} standard would be expected to occur during the two year backfilling operation. PM_{10} emissions would be comparable, but about 15 percent less, than during operations.

4. Impacts to visibility would also occur during the two year period of backfilling, but impacts would be less than during operations. Visibility impacts would not be significant.

4.6.3 REGULATORY REQUIREMENTS THAT LIMIT PROJECT IMPACTS

1. Construction and operation of the Briggs Project would be subject to federal, state, and ~~county~~ APCD rules and regulations, as implemented through the provisions of the Clean Air Act, pertaining to the control of emissions to the air. Regulatory review for BACT and compliance with other emission control regulation discussed in Section 3.6.3 was determined in coordination with the APCD during preparation of the Authority to Construct permit application (Air Sciences, Inc., 1994). The following requirements of APCD, CARB, and the BLM would apply to the Briggs Project:

   - Diesel-fired generators would incorporate BACT for NO_x control. The BACT for the generators is SCR plus timing retard.
   - The primary crusher would incorporate BACT for PM_{10} control. BACT for the primary crusher is water sprays. This control system would also achieve the requirements of NSPS Subpart LL, and APCD Rule 404-A.
   - Secondary and tertiary crushers, screens, and the lime silo would incorporate BACT for PM_{10}. BACT for these sources is a baghouse. This control system would also meet the requirements of NSPS Subpart LL and APCD Rule 404-A.
   - The portable conveyors for transporting ore between the crushing circuit and the heap leach pad would utilize water sprays for PM_{10} control, as required by APCD Rule 401.
   - The doré furnace would be equipped with a wet scrubber ~~to meet~~ and tested in accordance with the requirements of NSPS Subpart LL and APCD Rule 404-A.
   - Fugitive dust emissions from ore hauling would be controlled with routine application of water and surfactant. This control measure would meet the requirements of APCD Rule 401.

- Fugitive dust emissions from drilling in the mine pit would be controlled using a pneumatic flushing and filter system, water injection, or other measures as required by APCD to meet Rule 401.
- Watering of roads and earthmoving areas would occur during onsite construction and for offsite borrow activities, if any. Surfactants would be used to reduce water consumption.

These control measures and their estimated control efficiencies are presented in Table 4.6.9.

4.6.4 MITIGATION MEASURES INCORPORATED BY PROJECT DESIGN

1. The following mitigation measures are incorporated by project design to minimize impacts to air quality during project construction and operations:
   - Onsite vehicles and equipment would be maintained on a routine basis to reduce exhaust emissions.
   - Roads would be maintained on a routine basis.
   - HCN emissions would be minimized by burying solution distribution lines on the top of the heap leach pad, providing impervious covers on process water ponds that may routinely contain cyanide solution, and controlling pH of cyanide solutions.

2. These mitigation measures would also be implemented for project alternatives, except the No Action Alternative. For the No Action Alternative, no mitigation would be required.

4.6.5 RESIDUAL IMPACTS

1. Unavoidable adverse air quality impacts would occur as a result of implementation of the Briggs Project. However, adverse impacts can be mitigated to a level that is less than significant except the emission of dust (PM_{10}) due to earthmoving, ore processing and other activities inherent to the project. The measures discussed in Section 4.6.3 and 4.6.4 would minimize these impacts. The emissions inventory conducted for air quality modeling of maximum operating conditions indicates that the impacts of all other air quality parameters would remain well below state and federal air quality standards.

2. Modeling of PM_{10} emissions indicates that, for the maximum short-term operating scenario and worst-case meteorological conditions (low wind speed, high stability), the California 24-hour PM_{10} standard of 50 $\mu g/m^3$ may be exceeded adjacent to the project boundaries. Based on the significance criteria identified and the results of modeling, PM_{10} concentrations in areas of public access that are greater than the state standard would be a significant impact. While the state standard would be exceeded on occasion, actual impacts would probably be

TABLE 4.6.9

PROPOSED AIR POLLUTANT CONTROL TECHNOLOGY AND EFFICIENCY

SOURCE	POLLUTANT	CONTROL	EFFICIENCY (%)
Hopper loading/primary crusher	PM_{10}	Water spray.	90
Secondary/tertiary crushers	PM_{10}	Baghouse.	99
Ore conveyors	PM_{10}	Water spray.	80
Lime silo	PM_{10}	Baghouse.	99
Doré furnace	PM_{10}	Wet scrubber.	90
Haul roads	PM_{10}	Water sprays/dust palliatives.	92
Drilling	PM_{10}	Pneumatic flushing/ water injection.	85
Blasting	PM_{10}	Use of the minimum amount of explosives necessary to achieve the objectives of the blast, and stemming of blast holes.	Undetermined
Generators	PM_{10}	Timing retard.	-50
	NO_x	Timing retard.	43
	SO_2	Timing retard.	0
	CO	Timing retard.	-5
	VOCs	Timing retard.	-100
	NO_x	SCR.	80
Leach Pad	HCN	Buried distribution lines/ pH control.	Undetermined
Pregnant and Barren Solution Ponds	HCN	Impervious cover/ pH control.	100

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Source: Air Sciences, Inc., 1994.

much lower than indicated by the modeling results. In addition, the potential for public exposure to unhealthful levels of particulates is considered to be low because of the remote location of the site and the local nature of elevated PM_{10} concentration. In addition, the ~~health-based~~ federal PM_{10} standard would not be exceeded.

3. Based on the magnitude of estimated emissions of PM_{10} adjacent to the site access road for periods of more concentrated traffic (i.e., during shift-changes or offsite borrow), the California 24-hour PM_{10} standard, and possibly the federal standard, may be exceeded. This impact would also be significant pursuant to the criteria identified. However, the elevated PM_{10} concentrations would be localized.

4. Regional visibility impacts would not significantly affect DVNM or CLNAWS, or lands currently proposed for wilderness and Death Valley National Park.

5. All the air quality impacts are reversible. Therefore, unavoidable adverse effects would be short term. Following reclamation activities, emissions would return to near-baseline conditions. Residual elevated emissions, primarily wind-blown particulates, would further decrease as winnowing occurs and vegetation is reestablished.

4.6.6 MITIGATION MEASURES TO REDUCE RESIDUAL IMPACTS

1. As discussed in Section 4.6.5, PM_{10} impacts of the project exceed the criteria identified for significance. This section discusses additional mitigation measures recommended to reduce these impacts. Because the impact to air resources would be significant, mitigation is required under CEQA or a statement of overriding considerations must be justified. BLM resource specialists recommend that the additional mitigation measures discussed in this section be imposed as conditions of the Plan of Operations, if approved, to avoid unnecessary or undue degradation of federal lands.

2. To reduce PM_{10} concentrations, waste rock disposal locations should be controlled during high speed winds (i.e., greater than 20 mph) so that dumping occurs at locations that are the farthest upwind from points of potential public exposure. This mitigation would be enforceable if the project were required to maintain a continuous wind speed monitoring station and records of waste rock disposal locations at times of high wind. This measure

would reduce PM_{10} emissions at points of public exposure, but would not be expected to mitigate the impact below the level of significance (i.e., the California 24-hour PM_{10} standard would still be exceeded on occasion).

3. Requirements for surfacing of onsite roads with gravel, emulsions, or other materials were considered as potential additional measures for mitigation of onsite dust sources, but determined not to be necessary. The Proposed Action already includes road watering and use of surfactants, where necessary to control dust. A control efficiency of approximately 90 percent has been proposed using these methods. Additional measures would not substantially improve this control efficiency.

4. To provide additional control of offsite emissions, Canyon should treat and maintain the access road with an emulsion compound. This measure would be capable of 90 percent dust emission control. This is the same level of control that would be achievable by paving. (Based on EPA's AP-42 compilation of air pollution emission factors [1985], paving and emulsion compounds are both capable of 90 percent control.) However, an emulsion treated surface would not have some of the drawbacks of paving. A paved surface would not be durable to the anticipated traffic loads (including deliveries of supplies and equipment) without a properly prepared subgrade. To construct a paved road, the existing road surface would have to be excavated and recompacted, and a gravel base applied. Engineered drainage would be required at wash crossings. Construction of a paved road is considered infeasible due to the WSA status of lands along both sides of Wingate Road. WSA lands abut the road, beginning at the road edge. A smooth paved road surface could also encourage substantially increased traffic through the area, with related environmental impacts.

5. Enforcement of the emulsion requirement for the access road could be implemented through Canyon's routine reporting of road surface conditions and maintenance, and periodic field checks during routine inspections by BLM and the County. Road surface treatment with proper application and maintenance would be expected to reduce the PM_{10} impact of access road traffic to a level that is less than significant.

6. It is expected that clay that may be excavated from the playa would have a relatively high moisture content because of capillary forces drawing water upward to the playa surface from the shallow ground water table. It is expected that the high moisture content would adequately control dust emissions from clay excavation and from potential wind winnowing from the haul vehicle during transport to the leach pad construction site. Canyon should implement a

monitoring program to assure that the clay borrow contains adequate moisture to prevent excessive dust. Canyon should submit a detailed plan for moisture monitoring (i.e., sample method, frequency, etc.) prior to each phase of borrow. If the moisture of the clay material being excavated or hauled drops below four percent, excavation should be halted during periods of high speed winds and, when excavation and hauling does occur, each load should be covered (e.g., tarped) or wetted prior to transport.

7. An array of additional measures that could be implemented to reduce offsite PM_{10} emissions were also considered as outlined below:

   - Organized carpooling, vanpooling or busing for employee transportation to the site.
   - Watering of the access road before each shift change.
   - Surfacing the access road with gravel.

   Implementation of any of these measures instead of the recommended measure would be less effective and, therefore, these measures have not been recommended.

8. The additional mitigation measures recommended in this section would be applicable to the Proposed Action or any of the alternatives, except the No Action Alternative.

4.7 LAND USE, RECREATION AND WILDERNESS

1. Criteria for evaluating potential land use impacts are based on compatibility of proposed activities with surrounding land uses and on conformance with applicable plans, policies, ordinances, and regulations. Impacts would be considered significant if:
   - Proposed land uses would result in substantially unmitigated conflicts with existing, planned or adjacent land uses.
   - Proposed uses and activities would be in conflict with applicable land use laws, regulations or ordinances.
   - Proposed actions would not be in conformance with approved land use and environmental plans and goals.
   - Proposed actions would result in impacts to WSAs that would violate BLM's H-8550-1 policy or 43 CFR 3802 regulations for management of these lands.
   - Proposed actions would result in impacts to wilderness areas that would violate the Wilderness Act, the DPA (if passed), 43 CFR 8560 regulations, or applicable air or water quality standards.

4.7.1 PROPOSED ACTION

4.7.1.1 Consistency with Plans, Policies, and Regulations

4.7.1.1.1 Bureau of Land Management and the Desert Protection Act

CDCA Plan

1. Mining operations are consistent with BLM multiple-use objectives outlined in the CDCA Plan and the Class L designation of the site vicinity. In order to achieve the balance between resource use and resource preservation sought in the plan, the proposed Briggs Project would be required to implement measures to prevent unnecessary or undue degradation and provide protection to nonmineral resources. Specific requirements to achieve these goals are further discussed in Section 4.7.3.

Wilderness Study Area Impacts

1. As described in Section 3.7.1.1.2, no portion of the project site is within a WSA. The project site would, however, as applicable, be managed in accordance with both 43 CFR 3802 and 43 CFR 3809 regulations. These regulations establish procedures to prevent impairment of the suitability of lands under wilderness review, to prevent unnecessary or undue degradation by mining activities, and to provide environmental protection of the public lands and

resources. The site would also be managed with concern for the BLM's *Interim Management Policy and Guidelines for Lands Under Wilderness Review* (H-8550-1). These guidelines are applicable to the management of wilderness study areas.

2. Although the project site is not within a WSA, it is surrounded by WSAs. Table 4.7.1 summarizes the Proposed Action's potential impacts on existing WSAs in the site vicinity (see Figure 3.7.1 for location of vicinity WSAs). At the time of publication of this Draft EIS/EIR, wilderness areas have not been designated, and the WSAs remain subject to the requirements of the FLPMA for wilderness preservation.

3. The primary impacts which could affect the WSAs surrounding the project site include effects to air quality and visual resources, and noise impacts. Limited impacts to vegetation, water and wildlife would also occur proximal to the project. This section provides an overview of these impacts. The impacts summarized in Table 4.7.1 are discussed in more detail in other specific environmental resource sections of this chapter.

4. Air quality, visual, and noise impacts of the project would decrease with increasing distance from the project site. The proposed mine's impacts on WSAs would, therefore, be most substantial on the WSAs immediately surrounding the project site. The range of impacts would be limited by mountainous topography to the east, north, and south of the site, and attenuated by distance across the playa to the west and north.

5. Air quality and noise impacts would only occur during the construction and operational period of the mine. Impacts due to direct visibility of night lighting and the potential for skyglow would also be limited to the operational lifespan of the mine. The primary long-term impact would be the visual contrast of the mine pit highwall, and heap leach and waste rock piles.

6. Measures to mitigate impacts to WSAs are the same measures that would be implemented to mitigate the resource-specific impacts discussed in other sections of this chapter. Section 2.2.2.7 specifies details of monitoring that would occur to ensure that the anticipated project impacts are not exceeded. The impact monitoring plans in Section 2.2.2.7, in conjunction with implementation of the mitigation monitoring plan included in Appendix F, would assure protection of the WSAs. Mitigation measures are proposed to reduce impacts to WSAs for each applicable environmental resource category. A trade-off exists between

TABLE 4.7.1

SUMMARY OF IMPACTS TO EXISTING WILDERNESS STUDY AREAS AND DVNM[1]

WSA	POTENTIAL IMPACTS			
	Air Quality	Visual	Noise	Other
Slate Range (142)	• Increase in concentration of emissions due to onsite activities. Emissions from onsite activities would not exceed significance thresholds beyond the immediate vicinity of the project site. With exception of the California 24-hour PM_{10} standard, no significance thresholds would be exceeded. • California 24-hour PM_{10} standard, and possibly the federal PM_{10} standard, may be exceeded in immediate vicinity of Ballarat and Wingate roads when shift changes and road maintenance occur. Recommended additional mitigation measures discussed in Section 4.6.6 would reduce routine traffic emissions to below these significance criteria. • Minor visibility degradation would occur within a few kilometers of the project site. Only viewing angles within about 20 degrees of looking directly into the sun would be affected. • Minor increase in PM_{10} would occur adjacent to Wingate Road due to clay hauling if the north borrow area is utilized.[2] Because clay hauling activities would include treatment of the road surface to control dust, it would not result in standards being exceeded. • Localized PM_{10} impacts could occur if the north borrow area is utilized.[2] This impact would only occur for brief (two to three-month) periods. • Potential for minor and localized odor associated with emission of H_2S from soil excavation could occur if the north borrow area is used.[2] This impact would be brief. Any odor would dissipate quickly following the cessation of excavation activities.	• Proximal to distal views of most site facilities would be possible from much of the northern portion of this WSA. The site would not be visible from the southeastern portion of this WSA, or the portion that lies west of the ridgeline of the Slate Range. • Night lighting would be visible from the playa and east side of the Slate Range. • Skyglow may be visible from some areas when moonless nights occur coincident with certain atmospheric conditions. • Minor visual impact of microwave station at western border of this WSA.	• Project noise would be audible from proximal locations within this WSA. The routine noise level would be low due to distance to most project activities. Clay borrow may occur adjacent to this WSA resulting in heavy equipment noise for several brief phases of borrow activity. • Away from the immediate vicinity of activities, noise levels would be very low to nondiscernible. However, under calm atmospheric conditions, blasting would be audible throughout most of this WSA. Blasting noise would be short in duration (usually once per day and lasting less than several seconds), and except for proximal areas, blasting noise would be low.	• As much as 10 feet of ground water drawdown could occur due to pumping for the mine water supply. • Vegetation at the margin of the playa may be affected by ground water drawdown. • Surface drainage from Redlands Canyon would be intercepted by the mine pit following completion of reclamation until the pit fills with sediment. • Noise and human presence may temporarily reduce habitat value in the immediate vicinity of the site.
Manly Peak (137)	• Increase in concentration of emissions due to onsite activities. Emissions from onsite activities would not exceed significance thresholds beyond immediate vicinity of project site. With the exception of the California 24-hour PM_{10} standard, no significant thresholds would be exceeded. • California 24-hour PM_{10} standard, and possibly the federal PM_{10} standard, may be exceeded in the immediate vicinity of Wingate Road when shift changes and road maintenance occur. Recommended additional mitigation measures discussed in Section 4.6.6 would reduce routine traffic emissions to below these significance criteria. • Minor visibility degradation in proximity to the site, particularly at lower elevations. Only viewing angles within 20 degrees of looking directly into the sun would be affected. Visibility would not be measurably degraded at higher elevations due to topography and prevailing winds (see Section 4.6). • Minor increase in PM_{10}, adjacent to Wingate Road due to clay hauling if one of the playa borrow sites is utilized. Because clay hauling activities would include treatment of the road surface to control dust, it would not result in standards being exceeded.	• Mine components would be visible from lower foothill and alluvial fan areas in the northwestern portion of this WSA. Topography would shield views of the mine from the majority of the WSA. The waste rock piles and heap leach pad could be viewed from isolated higher points to the northeast and south of the mine. • Night lighting would be visible within lower elevations of the WSA. • Potential for skyglow, primarily from more proximal portions of the WSA and high peaks.	• Project noise would be audible from proximal locations within this WSA. The routine noise level would be low due to distance to most project activities. • Away from the immediate vicinity of activities, noise levels would be very low to nondiscernible. However, under calm atmospheric conditions, blasting would be audible throughout most of this WSA. Blasting noise would be short in duration, and except for proximal areas, blasting noise would be low.	• Potential for minor interruptions in wildlife movement patterns. No migration paths critical to wildlife are known to occur in vicinity. • As much as 10 to 20 feet of ground water drawdown may occur at the boundary of the project. No impact to vegetation would occur because ground water in this area is naturally deep. • Minor change in area where the Redlands Canyon flow path enters the WSA from the mine site. • Access to hiking trail into Redlands Canyon from the west would be precluded during mine construction and operation, and the trail would be permanently removed by the mine pit excavation. • Steps would be taken to protect the integrity of the Manly Peak WSA boundary where it borders the project site. At the onset of project construction, Canyon would place clearly identifiable markers along the WSA boundary (determined by BLM) where it coincides with the project site. All mining activities and structures would be confined within the project boundary. In areas where construction of site facilities is planned within 100 feet of the WSA, Canyon would coordinate construction with BLM and BLM may require that steps in addition to marking the WSA boundary be taken.
Middle Park Canyon (137A)	• Minor increase in concentration of emissions from onsite activities. This effect would primarily be limited to the westernmost portion of the WSA. No significance thresholds would be exceeded. • California 24-hour PM_{10} standard, and possibly the federal PM_{10} standard, may be exceeded in the immediate vicinity of Wingate Road when shift changes and road maintenance occur. Recommended additional mitigation measures discussed in Section 4.6.6 would reduce routine traffic emissions to below these significance criteria. • Visibility is not expected to be noticeably affected. Some minor degradation may occur for viewing angles toward the sun when low-speed south winds and stable meteorological conditions occur. • Minor increase in PM_{10}, adjacent to Wingate Road due to clay hauling if one of the playa borrow sites is utilized. Because clay hauling activities would include treatment of the road surface to control dust, it would not result in standards being exceeded.	• For virtually all of the WSA, views of the site would be blocked by intervening topography. However, the north waste rock pile would be visible from the westernmost edge of this area. • Night lighting may be visible from the westernmost edge of this area. • Potential for skyglow from some areas when moonless nights coincide with certain atmospheric conditions.	• Blasting may be audible. Noise would be low level and very short in duration. • Increase in traffic-related noise would occur adjacent to Wingate Road.	–

(1) Impacts addressed in this table are discussed in more detail in resource-specific sections of this chapter (e.g., Section 4.3, Water Resources; Section 4.6, Air Quality; Section 4.8, Visual Resources, etc.).
(2) The south borrow area is located within WSA 142 and could only be used if the WSA status of this area is removed by the DPA. Therefore, the south borrow area would have no effect on the WSA.

TABLE 4.7.1

SUMMARY OF IMPACTS TO EXISTING WILDERNESS STUDY AREAS AND DVNM[1]
(Continued)

WSA	POTENTIAL IMPACTS			
	Air Quality	Visual	Noise	Other
Surprise Canyon (136)	• Minor increase in concentration of emissions from onsite activities. This effect would primarily be limited to the westernmost portion of the WSA. No significance thresholds would be exceeded. • Visibility is not expected to be noticeably affected. Some minor degradation may occur for viewing angles toward the sun when low-speed south winds and stable meteorological conditions occur.	• Intervening topography would block views of the mine from most of this area. Views would be limited to the western edge of the WSA, looking down the Panamint Valley. Views would be restricted to about 2 degrees field of vision at a distance of approximately 16 miles. • Potential for minor skyglow from some areas when moonless nights coincide with certain atmospheric conditions.	• Blasting may be audible at some locations under calm atmospheric conditions. Noise would be low level and very short in duration.	–
Wildrose Canyon (134)	• No material impacts to air quality or visibility are expected in this WSA.	• North waste rock pile and leach pad would be visible from southern portion of this area. From the northern portion of this area, the mine would only be visible from viewpoints higher than 1,800 feet. All views would be very distant (about 24 to 30 miles) and would occupy about 2 to 3 degrees of the field of view. • Night lighting may be visible from the same areas and distance as project facilities. • Potential for minor skyglow when moonless nights coincide with certain atmospheric conditions.	• Blasting may be audible under calm atmospheric conditions. Noise would be low level and short in duration.	–
Panamint Dunes (127)	• No material impacts to air quality or visibility are expected in this WSA.	• North waste rock pile and leach pad would be visible from viewpoints higher than 2,000 feet, and would occupy about 1 degree of the field of view, at a minimum distance of 30 miles. Mine would not be visible from the valley floor portion of this WSA. • Night lighting may be visible. • Potential for minor skyglow when moonless nights coincide with certain atmospheric conditions.	• Blasting may be audible under calm atmospheric conditions. Noise would be low level and short in duration.	–
Argus Range (132B)	• No material impacts to air quality or visibility are expected in this WSA.	• Mine would be generally visible from this WSA. Views would be across the playa at distances exceeding 20 miles and comprise 2 to 3 degrees field of vision.	• Blasting may be audible under calm atmospheric conditions. Noise would be low level and short in duration.	–
Great Falls Basin (132)	• No material impacts to air quality or visibility are expected in this WSA.	• No portion of the mine would be visible from this area due to intervening Slate Range. Highest elevations throughout the area are from 4,300 to 4,700 feet, and elevations of 5,550 to 6,500 feet would be required to view the mine. • Night lighting would not be visible. • The microwave station on the ridge of the Slate Range would be visible from portions of this area.	• Project noise not expected to be generally audible from this WSA.	–
Darwin Falls (132A)	• No material impacts to air quality or visibility are expected in this WSA.	• No portion of the mine or related facilities or activities would be visible from this WSA.	• Project noise, including blasting, not expected to be generally audible from this WSA.	–
DVNM	• No material impacts to air quality or visibility in DVNM are expected.	• No portion of the mine would be visible from DVNM. • Night lighting would not be visible. • Potential for minor skyglow when moonless nights coincide with certain atmospheric conditions.	• For the vicinity of DVNM proximal to Redlands Canyon, blasting may be audible under calm atmospheric conditions. Noise would be low level and short in duration.	–
Total Areas Affected	• Air quality impact significance threshold may be exceeded in the immediate vicinity of the site and Wingate Road, affecting small portions of three WSAs (Manly Peak, Slate Range and Middle Park Canyon), with minor increase in air emission concentrations in one additional WSA. Potential for temporary minor and localized odor in one WSA (Slate Range) if clay borrow from the playa occurs and there are resultant emissions of H_2S. Any odor would dissipate quickly following cessation of excavation activities. Minor reduction in visibility in the immediate site vicinity affecting two WSAs (Manly Peak and Slate Range). On occasions when stable atmospheric conditions occur coincident with low-speed south winds, there may be a minor reduction in visibility at one additional WSA (Surprise Canyon).	• Proximal views of site facilities and activities would be possible from limited portions of two WSAs (Slate Range and Manly Peak). Limited and/or very distal views of site facilities and/or night lighting may be possible from five additional WSAs.	• Routine project noise would be audible from two WSAs (Slate Range and Manly Peak). Under calm atmospheric conditions, blasting may be audible from five additional WSAs and the proximal portion of DVNM, but would be low level and short in duration (usually once per day and lasting less than several seconds).	• Two WSAs affected (Slate Range and Manly Peak).

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[1] Impacts addressed in this table are discussed in more detail in resource-specific sections of this chapter (e.g., Section 4.3, Water Resources; Section 4.6, Air Quality; Section 4.8, Visual Resources, etc.).

mitigation for air quality and water use impacts because ground water is withdrawn for use to control dust. The water necessary to control dust would be reduced through the use of surfactants. Dust emissions must be controlled in accordance with state and federal laws.

7. The Proposed Action is consistent with land use plans, regulations and policies for the area. The boundaries of WSAs surrounding the site exclude the project lands because of historic mining disturbances. None of the proposed activities would violate BLM policies or applicable regulations for management of WSAs.

Proposed Wilderness Area Impacts

1. Table 4.7.2 summarizes the potential project impacts on areas proposed as wilderness under the DPA. As discussed in Section 3.7.2, impacts of the project have been addressed considering concepts of the DPA, without basing the analyses on specific locations of the proposed wilderness boundaries, which may be subject to change.

2. The project would be managed with concern for the surrounding wilderness area resources, and in accordance with the objectives of 43 CFR 8560. The purpose of these regulations is to manage wilderness areas to preserve and protect their wilderness character. Mining operations and site reclamation would also recognize the objectives and provisions of the DPA, if passed, and the 1964 Wilderness Act.

3. The project site and contiguous lands are not recommended for wilderness under the DPA. As discussed in Section 3.7.1.1, the middle portion (16,105 acres) of WSA 137, Manly Peak, is proposed as wilderness under the DPA. This portion that is proposed for wilderness is not adjacent to the site. The western boundary of the proposed wilderness would be about one mile east of the project. Passage of the DPA would, however, result in wilderness area in relative proximity to the site.

4. The DPA does not recommend the Slate Range WSA (142) west of the site, nor Middle Park Canyon WSA (137A) to the north, for wilderness consideration. Upon passage of the DPA, these areas would be returned to multiple use land status. As discussed in Section 3.7.2, the southwest portion of WSA 142, beginning about 2.5 miles south of the site, is proposed for wilderness in H.R.518 as of the date of this printing, but not in S.21.

5. The proposed microwave relay station would be constructed on the ridge of the Slate Range. The proposed location is not in a BLM WSA and it not recommended for wilderness under the DPA. It is located adjacent to the Slate Range WSA, and about three miles from the portion of this WSA that is recommended for wilderness under H.R. 518.

6. Project-related air quality, visual and noise impacts to surrounding wilderness areas would be limited by intervening topography and distance, and would vary dependent on atmospheric conditions. Impacts to wilderness areas beyond the Panamint Valley (e.g., Great Basin Falls) would be negligible. The project would not result in air quality standards being exceeded within any of the proposed wilderness areas. Noise impacts beyond the immediate vicinity of the project would be limited to very low-level noise. Under calm atmospheric conditions, low noise levels from blasting may be audible at locations distal from the project. However, this noise would be virtually instantaneous (less than a few seconds) and would usually occur only once per day. Blasting would occur only during daylight hours. Most of the primary impacts of the project would cease upon closure of the mine within six to eight years. Visual impacts of topographic disturbances would be long term, but would be limited due to the distal location of areas proposed for wilderness or intervening topography.

7. The proposed project is not anticipated to result in significant impacts to any of the proposed wilderness areas. Measures to mitigate impacts are specified within the respective resource-specific sections of this chapter. Section 2.2.2.7 specifies details of monitoring that would occur to ensure that anticipated project impacts are not exceeded. These impact monitoring plans, in conjunction with implementation of the mitigation monitoring plan included in Appendix F, would assure protection of area resources.

8. Although, as summarized in Table 4.7.2, the project may impact proposed wilderness areas proximate to the operation, it is not the intent of Congress to preclude such uses adjacent to proposed wilderness areas. Regarding buffer zones, Section 105 of the proposed DPA states the following:

> "The Congress does not intend for the designations of wilderness areas in Section 102 of this Act to lead to the creation of protective perimeters or buffer zones around any such wilderness area. The fact that nonwilderness activities or uses can be seen or heard from areas within a wilderness shall not, of itself, preclude such activities or uses up to the boundary of the wilderness area."

TABLE 4.7.2

SUMMARY OF IMPACTS TO PROPOSED WILDERNESS AND NATIONAL PARK AREA[1]

PROPOSED WILDERNESS	LOCATION[2]	POTENTIAL IMPACTS			
		Air Quality	Visual	Noise	Other
Slate Range[3] (142)	Comprises the southwestern portion of the Slate Range WSA, and some additional land in Searles Valley. At its closest point, this proposed wilderness area is located about 2.5 miles south of the project site.	• Minor increase in concentration of emissions. No significance thresholds would be exceeded. • Visibility is not expected to be noticeably affected. Some minor degradation may occur when low speed winds blow toward the south, concurrent with stable atmospheric conditions. Highest potential for this condition would be at night. Measurable visual degradation would be infrequent and not significant.	• The mine site would be generally visible from portions of the Slate Range in the western part of this proposed wilderness. Views would be distal (i.e., about 4 to 10 miles) and would encompass about 5 to 13 degrees of the field of view. The mine site would not be generally visible from the valley floor or Panamint Range in the eastern portion of this proposed wilderness. • Night lighting may be visible from the portion of this area where site is visible. • Minor skyglow may be visible when dark nights occur concurrent with certain atmospheric conditions.	• Routine project noise not expected to be generally audible from this area. • Blasting would be audible but would be low level and very short in duration (usually once per day and lasting less than several seconds).	–
Manly Peak (137)	Comprises approximate middle half (east to west) of Manly Peak WSA. At its closest point this proposed wilderness is approximately one mile east of the proposed mine.	• Minor increase in concentration of emissions. No significance thresholds would be exceeded. • Visibility is not expected to be noticeably affected. Because of topography and prevailing winds (see Section 4.6), visibility degradation at proximal portions of this wilderness would be substantially less than the minor impacts predicted for the immediate project vicinity discussed in Section 4.6.1.3.3.	• Mine components generally shielded by intervening topography. Mine pit and high wall would not be visible from any point. Portions of leach pad, north waste rock pile and borrow area may be visible from limited viewpoints within the wilderness boundary (See Figures 4.8.4 and 4.8.5). • Night lighting may be visible from the same areas as project facilities are visible from. • Potential for skyglow, primarily from more proximal portions of the proposed wilderness and high peaks.	• During calm atmospheric conditions, routine project noise may be audible from proximal locations within wilderness area at low levels. • Blasting would be audible but would be low level throughout most of the wilderness, and very short in duration (usually once per day and lasting less than several seconds).	• Potential for minor interruptions in wildlife movement patterns. No migration paths critical to wildlife are known to occur in the vicinity. • Access to the hiking trail into Redlands Canyon from the west would be precluded during mine construction and operation, and the trail would be permanently removed by the mine pit excavation.
Surprise Canyon (136)	Comprises a little more than western half of Surprise Canyon WSA. At its closest point this proposed wilderness is located about six miles north-northeast of project site.	• Minor increase in concentration of emissions. No significance thresholds would be exceeded. • Visibility is not expected to be noticeably affected. Some minor degradation may occur when low speed winds blow toward the north, concurrent with stable atmospheric conditions. Highest potential for this condition would be at night. Measurable visual degradation would be infrequent and not significant.	• Mine would not be visible from the mountainous portion of this wilderness area due to intervening topography. • North waste rock pile and leach pad would be visible only from the westernmost portion of this wilderness. Closest view would be 16 miles from the mine and would comprise approximately 2 degrees of the field of view. • Night lighting may be visible from the same portion of this area where the north waste rock pile and leach pad may be seen. • Skyglow potential would be minimal. Minor skyglow may be visible when dark nights occur concurrent with certain atmospheric conditions.	• Blasting may be audible at some locations under calm atmospheric conditions. Noise would be low level and very short in duration. • Short-term noise associated with borrow hauling if the north borrow area (near Ballarat) is utilized. This impact would only occur for brief periods (two to three months per borrow phase).	–
North Argus (132B)	Encompasses most of the eastern flank of the Argus Range east of CLNAWS. At its closest point, this proposed wilderness is about nine miles west of project site.	• No measurable impacts to air quality or visibility are expected.	• Slate Range intervenes between the site and southern portion of this area. In this region, sections of the highwall could be seen from some points, and less frequently, the waste rock piles and leach pad could be visible from highest viewpoints. These views would comprise approximately 5 degrees of the field of view, at a distance of about 13 miles. • From the northern portion of this area, the mine would be generally visible as seen across the playa (distances from 13 to 26 miles). • Potential for night lighting visibility from across the playa.	• Noise not expected to be generally audible from this area. Blasting may be audible under calm atmospheric conditions. Noise would be low level and short in duration.	–

TABLE 4.7.2

SUMMARY OF IMPACTS TO PROPOSED WILDERNESS AND NATIONAL PARK AREA[1] (Continued)

PROPOSED WILDERNESS	LOCATION[2]	POTENTIAL IMPACTS			
		Air Quality	Visual	Noise	Other
Great Falls Basin (132)	Boundaries are approximately the same as the Great Falls Basin WSA. This proposed wilderness is located in the Argus Range on the west side of Searles Valley. Located about 11 miles from the project site at its closest point.	• No measurable impacts to air quality or visibility are expected.	• No portion of the mine would be visible from this area due to intervening Slate Range. Highest elevations throughout the area are from 4,300 to 4,700 feet, and elevations of 5,550 to 6,500 feet would be required to view the mine. • Night lighting would not be visible. • Skyglow potential would be limited because of intervening topography. However, minor skyglow may be visible when dark nights occur concurrent with certain atmospheric conditions.	• Noise not expected to be audible from this area.	–
Darwin Falls (132A)	Encompasses the southernmost portion of the Darwin Falls WSA and additional lands to the south.	• No measurable impacts to air quality or visibility are expected.	• No portion of the mine would be visible from this area due to intervening Slate Range. • Night lighting would not be visible.	• Noise not expected to be audible from this area.	–
Proposed Death Valley National Park Area	South of site: Park boundary would encompass easternmost portion of Slate Range WSA extending southward to the northern boundary of CLNAWS. No portion of the park would be directly south of the project site. East of site: Approximate east 1/4 of Manly Peak WSA would be designated as park. At closest point the proposed boundary is about 2.5 miles east of the project site. North of site: To the north and northwest of the site, the existing DVNM boundary would be moved west and south to encompass additional lands. The park would include approximately half of the Surprise Canyon WSA (136), the majority of Wildrose Canyon WSA (134), all of Panamint Dunes WSA (127), and part of Darwin Falls WSA (132A). West of site: No portion of the park would lie directly west of the project site.	• No measurable impacts to air quality or visibility are expected.	• Due to steep intervening topography, the mine would not be visible from locations to the north, east, or south of the mine. • Part of the north waste rock pile would be visible from portions of the proposed Death Valley National Park area which are currently designated as WSA 134 (northwest of project site). These views would be possible at elevations exceeding 2,600 feet, and would comprise about 2 degrees of the field of view at a distance of approximately 24 miles. • Within the proposed Death Valley National Park area currently designated as WSA 127, the north waste rock pile and leach pad would be visible from viewpoints higher than 2,000 feet and would occupy 1 degree of the field of view, at a minimum distance of 30 miles. The mine would not be visible from the valley floor portion of the proposed Death Valley National Park in this vicinity. • Night lighting would be visible only from distal locations north/northwest of mine. Intervening topography would prevent views of night lighting at other locations. • Minor skyglow may be visible when dark nights occur concurrent with certain atmospheric conditions.	• Mine operation would not be expected to be generally audible in proposed Death Valley National Park areas. • Blasting may be audible from some areas, particularly in immediate vicinity of project site (i.e., near Redlands Canyon). Impact would be low level, and short duration.	–
Total Areas Affected		• Minor increase in concentration of emissions in three proposed wilderness areas (Slate Range, Manly Peak and Surprise Canyon). No significance thresholds would be exceeded. Visibility is not expected to be noticeably affected.	• Limited and/or distant views of mine facilities, night lighting or minor skyglow may be possible from portions of five proposed wilderness areas and Death Valley National Park. Impacts would be minor and would not attract attention.	• Under calm atmospheric conditions, routine project noise may be audible from the portion of the proposed Manly Peak wilderness that is closest to the project. Under calm atmospheric conditions, blasting may be audible from three additional wilderness areas and portions of the proposed Death Valley National Park.	• Effects limited to portion of the proposed Manly Peak wilderness proximal to the project site.

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(1) Impacts addressed in this table are discussed in more detail in resource-specific sections of this chapter (e.g., Section 4.3, Water Resources; Section 4.6, Air Quality; Section 4.8, Visual Resources, etc.).
(2) A map of the wilderness areas and Death Valley National Park, as currently proposed under the DPA, is provided in Figure 3.7.3. However, this Draft EIS/EIR has been prepared to assess potential impacts of the project considering the concepts of the DPA, without basing the analyses on the specific locations of these boundaries, which are subject to change.
(3) As of the date of this printing, a portion of the Slate Range WSA is proposed for wilderness in H.R. 518 but not in S.21.

9. As currently drafted, the DPA would require that the suitability of certain lands for wilderness areas be reviewed after ten years from enactment. This review is to evaluate the status of "planned exploration, development and mining activities on, and suitability for future wilderness designations" of lands within Surprise Canyon, Middle Park Canyon, Death Valley National Park, and Manly Peak Wilderness Areas (as depicted on maps accompanying S.21). Under this provision, therefore, subsequent to the six-year operational life and reclamation of the project site, the WSA areas surrounding the site may be reconsidered for wilderness classification.

Proposed National Park Area Impacts

1. Mining on valid unpatented and patented claims within National Park System properties is permitted subject to the provisions of 36 CFR 9. The purpose of these regulations is to ensure that mining activities are conducted in a manner consistent with the purposes of the National Park System and to prevent or minimize impacts to environmental resources. Since the project site is not within any of the boundaries which have been proposed for Death Valley National Park, these regulations would not directly apply to the proposed mining operation. The project site would, however, be managed consistently with any provisions in these regulations which apply to indirect impacts of offsite uses.

2. The impacts of the Briggs Project on lands proposed for Death Valley National Park under the DPA cannot be precisely defined since the final proposed boundaries for the park are not available. Based on the current proposal, the park boundary would be extended approximately one mile west of the existing DVNM boundary in the vicinity of the project site. Some of the lands located between the project site and the current DVNM boundary would, therefore, be transferred from BLM to NPS jurisdiction. At its closest location, the park boundary would be located approximately 2.5 miles east of the project site. As currently proposed, the park would also include a portion of northern Panamint Valley including the Panamint Dunes WSA (127) and portions of the Surprise Canyon and Wildrose Canyon WSAs (136 and 134, respectively).

3. Dependent on the proximity of the final boundary, some of the potential impacts to the park (under enactment of the DPA) may be greater than those evaluated for the existing DVNM. Potential project impacts to the park are summarized in Table 4.7.2. Noise, lighting and aesthetic impacts would be negligible to the existing DVNM since the monument is on the other side of the mountain and the ridgeline lies about 3.5 miles to the west and several

thousand feet above the project site. However, if the boundary is extended westerly approximately one mile as currently proposed, the portion of the park to be located on the western side of the Panamint Range may be subject to some impacts from the project site. Although there is a possibility that minor sky glow may be visible under certain atmospheric conditions, and mining operations may be audible, at its nearest point, the park would be located over 2.5 miles, and generally 2,000 feet or more higher than the project site. Direct views of the project site from the proximal area of the park would be blocked by intervening topography (see Section 4.8).

4. Due to access and improvement constraints, it is unlikely that the expanded portion of the park in this vicinity would be a high activity area. The possible impacts (noise, visibility of glow from night lighting), therefore, would be considered unlikely to substantially affect future park visitors. Potential future park improvements, which could provide increased access to these areas, are not expected to occur during the life of the mining operation.

5. The potential impacts of the project on areas of the park in northern Panamint Valley would be minor. As described in Table 4.7.2, views of the site would be limited to small portions of the field of view (i.e., a few degrees or less), and park lands where the site area would be visible are far away (e.g., 24 miles or more). No measurable impacts to air quality or visibility are expected. Noise impacts are expected to be limited to low-level blasting noise of short duration, (i.e., several seconds or less, usually once per day).

6. Mitigation measures to protect wildlife (including the bighorn sheep), limit vegetation impacts, and minimize impacts on water resources, would be consistent with the goals of resource protection for the park. The project's reclamation plan would also be consistent with these objectives.

4.7.1.1.2 County of Inyo

1. The proposed project would be consistent with the County General Plan policies to promote multiple-uses of the Natural Resource Lands and to permit the production and conservation of minerals subject to protection of environmental values. The Proposed Action would develop gold ore deposits in an area recognized as having high potential for mineral resource development.

4.7.1.2 Compatibility With Existing Land Uses

4.7.1.2.1 Mining

1. Mining in the Panamint Range would be consistent with past and present mining activities at the project site. The proposed Briggs Project would alter the character of mining activity on the site, replacing facilities associated with abandoned underground gold mining with a modern open pit heap leach mining operation. Operation of the project would not interfere with mining exploration or future mining of claims in the surrounding canyons.

4.7.1.2.2 Recreation

1. As described in Section 3.7, the west-facing Panamint Range is used for a variety of recreational uses including: hiking and backpacking, mountain biking, horse riding, and motorized vehicle use such as offroad motorcycle and jeep tours. Each of these activities could be impacted to some extent by implementation of the project, particularly during the six-year operational life of the mine. Public access to the site would be prohibited for this period. Travel would not, however, be inhibited on Wingate Road. Recreational uses would be expected to continue uninterrupted in the surrounding canyons. Excavation of the mine pit would result in the permanent loss of the existing hiking trail around Manly Fall to Redlands Canyon. Manly Fall, a hiking destination, would also be removed. The mine pit and waste rock piles would permanently occupy about 110 acres of the existing alluvial fan surface, directly diminishing recreational values of these areas because the steep slopes of these features would limit access and the variety of possible uses. The portion of these features that occur on naturally steep topography (about 135 acres) would not substantially limit post-mining recreation compared to existing conditions. Offsite mitigation, as discussed in Section 2.2.4, would offset the impact to long-term multiple use opportunities. The offsite mitigation program would enhance multiple use opportunities of public lands in the vicinity through the reclamation of existing disturbances.

2. Mining activities could also affect the quality of the wilderness recreation experience in the project vicinity. Noise from heavy equipment and occasional blasting (usually once daily), artificial lighting, and reduced air quality within the immediate vicinity would reduce the opportunities for solitude and detract from the sense of remoteness within portions of the WSAs. If the DPA is passed, these project effects could also impact portions of the newly classified wilderness areas. Subsequent to site reclamation, however, the only anticipated project impact on wilderness recreation would be due to the physical modification of the project site. As discussed further in Section 4.8, portions of the site would be visible from

areas within lands proposed for wilderness under the DPA. These views would not be dominant, however. Upon revegetation of the majority of the project site, this impact would be minimized. Removal of the trail around Manly Fall would eliminate this access route into lands proposed for wilderness.

3. Panamint Valley is within the flight corridor for CLNAWS and is regularly overflown by military aircraft. Flights over the Panamint Valley include aerial combat maneuvering, and weapons test and evaluation flights. Within this Military Operations Area, high speed flights (in excess of 250 knots) and low-level flight (within 200 feet of ground level), result in visual and noise intrusions. Further, existing and former mining explorations have resulted in mining scars and operational impacts which detract from the wilderness experience. As described in Section 3.7.1.1, the BLM has not recommended the entire 32,026 Manly Peak WSA for wilderness based among other factors, on the marginal wilderness values.

4. The operational impacts of the project on the surrounding wilderness would be mitigated to some degree by the screening effect of the steep, rugged terrain. The primary long-term impacts to recreation, beyond the six-year operational period, would be limited to the site-specific modification effecting visual resources and the removal of the trail around Manly Fall.

4.7.1.2.3 Death Valley National Monument

1. Project implementation would not adversely impact DVNM. The potential impacts of noise, night lighting, air quality, aesthetics, and ground water withdrawal have been discussed within other sections of this report. As stated, the project site is separated from DVNM by a major ridgeline, and is approximately 28 miles away from the primary visitor attractions.

4.7.1.2.4 Military

1. Both the Slate and Argus ranges lie between the project site and the main CLNAWS facility. Due to the distance and the intervening topography, the mining operation is not anticipated to result in direct or indirect impacts to the physical plant at China Lake. The potential concerns of the project in relation to the CLNAWS operations would be effects of the project on low-level (200 feet above ground or higher) flights through the Panamint Valley, and minor reduction in visual range.

2. Flights within the Military Operations Area are prohibited within 500 feet above a structure or person. Although most of the low-level flights are directly over the valley floor, the proximity of the mining operation could potentially affect the allowed flight level for aircraft approaching the mountains during the six-year operational life of the project. Other impacts which could potentially affect the flights would include air quality (visibility), and night lighting.

3. As detailed in the air quality section of this report, air emissions from the mining operation would not significantly impact visibility range (see Section 4.6.1.3.3). The impact of night lighting would also be minimal. Lighting would be shielded and directed downward. The potential for "skyglow" would be limited because of the lack of particulates in the vicinity which could reflect the light.

4.7.2 ALTERNATIVES

4.7.2.1 No Action Alternative

1. Under the No Action Alternative, the project would not be developed and potential land use compatibility impacts associated with the mining operation would be eliminated. The short-term (six year) operational impacts to the wilderness (if designated) proximate to the site would be avoided. However, because existing plans for the region recognize the value of the area's mineral resources, and because policies support the development of these resources, the No Action Alternative would not be considered a superior alternative in meeting the long-term land use goals of either BLM or the County.

4.7.2.2 Alternative Ore Beneficiation Rates

1. For both the faster and slower ore beneficiation rate alternatives, physical changes to the site would be the same, as compared to the Proposed Action. Therefore, long-term land use compatibility impacts of the site following reclamation would not change. However, there would be no offsite mitigation under these alternatives so there would be an overall increase in long-term land use conflicts.

2. The slower ore beneficiation rate alternative would also increase short-term land use conflicts because site operations and reclamation would be prolonged by about four years. There would be a reduction in emission rates and negligible decreases in the level of lighting, traffic and noise. However, these reductions would not be enough to offset the increased land use conflict that would occur due to the additional four-year project duration.

3. The faster ore beneficiation alternative would result in increased emissions and incrementally increased levels of lighting, traffic and noise. Visibility impacts and related effects to CLNAWS would be slightly greater during operations, as well as other incremental increases in short-term impacts to Death Valley National Park, and the wilderness area proximate to the site under passage of the DPA. However because of the minor magnitude of these effects under the Proposed Action, the difference during operations may not be noticeable. The two-year shorter project duration would reduce the term of these impacts and allow post-mining uses of the site to occur approximately two years earlier. With the increases in the magnitude of impacts being small and the duration shorter, there would be a slightly reduced level of short-term land use conflict.

4.7.2.3 Reduced Project Size

1. The downsizing of the facility to result in an approximately 30 percent reduction of ore recovered would not reduce land use compatibility related impacts. Impacts would be similar during project operations although activities would occur over a slightly smaller area. Short-term impacts would be approximately two years shorter in duration. There would also be an effect of reduction due to the smaller amount of site disturbance. This alternative would not change the long-term impact to recreation access that would occur due to removal of the hiking trail through the project site into Redlands Canyon.

2. Based on an estimated 20 percent reduction in the portion of the mine pit and waste rock piles occupying the readily accessible terrain of the alluvial fan, there would be about 22 acres more area that would be readily accessible for recreation after reclamation is complete (110 x 0.20). However, offsite mitigation that would enhance multiple use values of public lands in the vicinity under the Proposed Action would not occur with this alternative.

3. The reduced project size alternative would not substantially reduce any of the significant impact of project implementation and is not necessary to avoid unnecessary or undue degradation of federal lands. The arbitrary limitation of mineral recovery would significantly conflict with federal mining laws and current applicable land use policies.

4. The reduced project size would not be considered to reduce land use conflicts because mining is part of the multiple use plans for the vicinity. Reduction of the project size would increase the conflict of nonmining uses with mineral production.

4.7.2.4 Balanced Waste Rock Piles

1. The balanced waste rock piles alternative would result in a small reduction in air quality impacts. The level of reduction would not materially change land use impacts as compared to the Proposed Action. Potential land use conflicts due to night lighting and noise would also be similar.

2. With the balanced waste rock pile configuration, the north waste rock pile would be less visible as compared to the Proposed Action (see Section 4.8), particularly from areas upland of the site, including the Manly Peak Wilderness proposed under the DPA. This would reduce short- and long-term visual impacts contributing to reduction of wilderness experience opportunities. The modified waste rock pile configuration would also slightly reduce recreation conflicts because the waste rock piles would be located over less of the more accessible alluvial fan terrain, being placed closer to the mountain flank. Impacts to long-term recreation access due to removal of the hiking trail around Manly Fall would not change.

3. Canyon has included the offsite mitigation plan discussed in Section 2.2.4 as part of this alternative. Environmental benefits of the offsite mitigation plan under this alternative would not change.

4. Overall, the balanced waste rock piles alternative would slightly reduce land use conflicts.

4.7.2.5 Partial Backfilling Alternative

1. During operations, the partial backfilling alternative would involve the same facility configurations, activities, and processing rates as the Proposed Action, except for construction of the north waste rock pile. The north waste rock pile would be constructed with a modified configuration over 300 feet higher and covering about 13 more acres than for the Proposed Action. This would increase the visibility of the pile (see Section 4.8) resulting in an incremental increase in the potential land use conflict of site operations with surrounding wilderness uses. Noise and lighting impacts on surrounding land uses during the operational period of the project would not change.

2. The partial backfilling alternative would extend the life of the project by about two years as compared to the Proposed Action. During this period, there would be accompanying impacts to surrounding land uses related to air emissions and noise that would be similar, but slightly

less than described for the Proposed Action. The majority of the site would remain unusable for recreation during this two year period. The visual character of the site would remain active for two years longer, and there would be related impacts of dust emissions and noise in adjacent areas that reduce the potential for primitive experiences and solitude.

3. The south waste rock pile would be largely removed under this alternative, and the final terrain of the approximately 21-acre portion of this pile that is located on the alluvial fan would be more accessible, and suitable for a wider variety of uses. Under the Proposed Action, the recreational value of this pile area would be low because the rocky slopes would result in difficult access and other use limitations. Partial backfilling would also improve the post-mining recreational value of approximately 7 acres where the north waste rock pile is shifted eastward, leaving more of the alluvial fan in an undisturbed condition (Figure 2.27). The approximate 50-acre backfill surface would also be readily accessible to recreationalists. Considering the backfill surface and waste rock pile areas combined, the partial backfilling alternative would improve long-term access for recreational use on about 78 acres of the site following mining. This benefit would be offset by the absence of offsite mitigation. The partial backfilling alternative would not restore hiking access to Redlands Canyon.

4. Partial backfilling of the mine pit would eliminate the potential hazard of the low side of the mine pit rim. However, because of improved access to the mine pit highwall, there may be little or no net hazard reduction onsite. Backfilling could encourage imprudent access to the pit highwall or areas above it.

5. The Proposed Action does not include partial backfilling, in part because mineralization will remain in the pit walls and floor that could be feasible to recover in the future if allowed by changes in prevailing economic conditions or mining technology developments. Partial backfilling could preclude the potential for future recovery of mineralization that would remain in the pit walls and floor, or substantially increase costs and environmental impacts of such recovery. Partial backfilling would, therefore, increase the land use conflict of nonmining uses with mining.

4.7.3 REGULATORY REQUIREMENTS THAT LIMIT PROJECT IMPACTS

1. The BLM, through the CDCA Plan, and the County, through the County General Plan, Zoning Ordinance, and other local plans and regulations, manage multiple-use activities in the

project vicinity. The policy framework of these planning documents recognizes mining as an appropriate activity at the project site. Reclamation of the site minimizes the potential for any long-term land use conflict associated with the project operation.

2. The project site is designated in the CDCA Plan for Multiple-Use Class L. As required for this class, mining operations must comply with the requirements of the 43 CFR 3809 regulations, the principal instrument of BLM to review, condition, and monitor mining operations. These requirements include:
   - Submitting of a Plan of Operations and Reclamation Plan.
   - Complying with applicable air quality standards, including the Clean Air Act.
   - Complying with applicable water quality standards including the Clean Water Act.
   - Complying with applicable standards for the disposal and treatment of solid wastes, including the Solid Waste Disposal Act, as amended by the RCRA.
   - Taking such action as may be needed to prevent adverse impacts to threatened or endangered species and their habitat.
   - Complying with applicable regulations for cultural resource protection, including Section 106 of the NHPA.
   - Furnishing financial assurance for reclamation.

3. County regulations require that mining operations be conducted in a manner that minimizes disturbance of the environment and that mined and disturbed lands are reclaimed. Project consistency with these objectives is determined through the County's discretionary review process under regulations such as SMARA and CEQA. This document is an integral part of the review process.

4.7.4 MITIGATION MEASURES INCORPORATED BY PROJECT DESIGN

1. Mitigation measures incorporated by project design to minimize potential land use conflicts, including impacts to WSAs and lands proposed for wilderness and Death Valley National Park under the DPA, are outlined in the respective sections under each environmental category throughout this document. In particular, operational measures for water resources, wildlife, air quality, noise, visual, and traffic impacts will mitigate potential land use conflicts to a level that is less than significant.

2. In addition to these measures to reduce potential land use conflicts during operations, steps would be taken to protect the integrity of the Manly Peak WSA boundary where it borders the project site. At the onset of project construction, Canyon would place clearly identifiable markers along the WSA boundary (determined by BLM) where it coincides with the project site. All mining activities and structures would be confined within the project boundary. In areas of the site where development is not planned, placement of the markers may be adequate to protect the boundary integrity. BLM consultation and approval would be obtained for any construction within 100 feet of the WSA boundary. At this stage of planning, Canyon is anticipating three parts of the proposed mine to be within 100 feet of the WSA boundary; the two waste rock piles and the southwest corner of the heap leach pad. For any construction closer than 100 feet, additional boundary protection measures may be necessary. For the waste rock piles, construction of earth berms may be required by BLM to prevent rocks from rolling into the WSA. Final location of the berms would be coordinated with and approved by BLM. For the southwest corner of the heap leach pad, final plans for the fence and perimeter grading would be reviewed by, and construction coordinated with, the BLM.

3. Upon site closure, the implementation of the reclamation plan (as outlined in Section 2.2.3), would reduce long-term land use conflicts result from implementation of the project.

4. These mitigation measures would also be implemented for project alternatives, except the No Action Alternative. For the No Action Alternative, no mitigation would be required.

5. Offsite mitigation is also incorporated by project design. Offsite mitigation would include reclamation of existing disturbances and/or other environmental and safety remediations to enhance the multiple use value of public lands in the vicinity. Details of the offsite mitigation program are discussed in Section 2.2.4. Canyon has included this offsite mitigation as part of the Proposed Action and as part of the balanced waste rock piles alternative. It is not part of any of the remaining alternatives.

4.7.5 RESIDUAL IMPACTS

1. Implementation of the Briggs Project would result in the short-term commitment of the site for mining uses and would result in a minimal level of conflict with current land uses. For the eight-year term of project construction, operations and reclamation, use of the site by recreationalists would be limited. Air quality (visibility) and night lighting impacts could also minimally affect the quality of the immediate site area for low-level and night-flight military

operations. No short-term impacts to DVNM would be anticipated, except possibly if the boundary is moved westward close to the project site in conjunction with the Death Valley National Park proposal. As discussed in Section 4.7.1, even in this case, effects would be minor.

2. Long-term impacts of the Proposed Action on land use are primarily related to: (1) approximately 110 acres of the site (consisting of the portion of the mine pit and waste rock piles that are on the alluvial fan) being reduced in value for nonmining uses; and (2) visual effects of the mine pit, waste rock piles and heap leach pile, which would decrease the opportunity for wilderness experiences. Removal of Manly Fall and the hiking trail around Manly Fall into Redlands Canyon also cannot be avoided if the project is implemented. These long-term impacts would be offset by the offsite mitigation program, which would enhance multiple use values of public lands in the vicinity through the reclamation of existing disturbances and/or other environmental and safety remediations.

3. Because the Briggs Project is consistent with land use plans, policies, laws and regulations and would not result in substantial land use conflicts, impacts to land use would not be significant. No additional mitigation is recommended.

4.8 VISUAL RESOURCES

1. This section evaluates the changes that would occur to scenic quality as a result of the Briggs Project. BLM's visual resource inventory of the area indicates that the slopes of the Panamint Range in the site vicinity are relatively sensitive to visual contrast by development, considering existing scenic values, visibility, and number and sensitivity of viewers. BLM's visual management goal for this part of the range is for changes not to be evident in the characteristic landscape. Changes can be seen, but should not attract attention. BLM's inventory indicates that the valley floor and alluvial fans are less sensitive to visual contrast. These areas are managed by BLM such that changes can be evident, but should remain subordinate to the existing landscape. Impacts to visual resources would be considered significant if there would be lasting effects resulting in contrast above these levels.

4.8.1 PROPOSED ACTION

1. As described in Section 3.8, views of the project site are confined to locations within Panamint Valley and the ridgeline to the west. The project would most often be seen as a distal view from Trona-Wildrose Road. Away from Trona-Wildrose Road, there are very few people to view the site. However, the County and BLM recognize that some visitors come to the area to enjoy its solitude and, therefore, would be sensitive to visual effects of the project.

2. Proximal views of the project would be possible from only a limited portion of the valley in the immediate vicinity of the site. From most of Wingate Road, the site would not be visible because of intervening topography. Topography also blocks views of the site area from the southernmost part of the valley (i.e., from the Coyote Canyon vicinity and southward). Distal views would be possible from off-road areas north and west of the site. Effects of project-related visual impacts would be limited because of the low number of people visiting the area and the lack of residences within view of the project location.

3. The project would affect the visual character of the site by: (1) changing its nature from passive to active during the short term of the operational period; (2) longer-term (e.g., decades) changes to surface colors and textures and vegetation cover; and (3) permanent changes to the site's topography. The degree to which each component would be visible would be related to the specific location of the observer in relation to intervening vegetation and topography.

4. The project facilities that would be most visible include the mine pit highwall, heap leach pile and waste rock piles. During operations, project buildings, equipment, machinery and other ancillary facilities would add to visual contrast. Lighting would change the nighttime character of the area for locations where it could be seen. These effects, however, would be short term. Upon completion of reclamation, the existing passive visual character of the site would be restored.

5. The reclamation plan discussed in Section 2.2.3 includes measures to reduce long-term visual impacts that would remain following completion of project activities. Pertinent measures are included in Section 4.8.4 addressing visual impact mitigation. The following section discusses photographic simulations of project visual effects representing views from the viewpoints discussed in Section 3.8. The photographic simulations depict the project configuration at completion of reclamation. However, except for proximal views, visual effects during operations are not expected to be substantially different.

6. The mine pit would eliminate the vertical topographic drop at the mouth of Redlands Canyon known as Manly Fall. On occasions when enough rainfall occurs over the Redlands Canyon watershed, this drop results in a waterfall. The incised nature of Redlands Canyon limits views of Manly Fall. Except for the very top of the fall (i.e., about the top 10 feet), it is not visible unless the viewer is directly aligned with the narrow incision of Redlands Canyon. This view is possible along only a very short segment of Wingate Road. Occurrence of running water over the fall is rare (Canyon personnel report seeing no surface water flows at the mouth of Redlands Canyon since 1987 when they began work at the site) and seldom observed because of the few people in the vicinity and limited view.

7. The proposed offsite microwave repeater station in the Slate Range would consist of a small (about 80-square foot) building and microwave relay antenna surrounded by security fencing. Nonreflective fencing and earth-tone paints would be used. With these measures and with the small size of the facility, it is not expected to attract attention.

8. If one of the playa borrow locations is used, visual impacts of that activity would be short-term. The borrow area would be left as a minor depression (e.g., about 4 feet deep) with gentle (5H:1V) side slopes. Because the playa surface is naturally featureless and unvegetated, the borrow site would not substantially contrast following the initial occurrence of surface water.

9. The offsite mitigation discussed in Section 2.2.4 that would occur as part of the Proposed Action would provide some incidental benefit to visual resources. Although visual resource impact mitigation would not be a primary goal of the offsite mitigation program, there would be a reduction in regional visual resource impacts due to the cleanup and reclamation of existing disturbances. As discussed in Section 2.2.4, the offsite mitigation program would include removal of abandoned buildings, equipment, waste and debris, and land restoration measures including grading, seedbed preparation and reseeding. The extent that these activities would reduce the visual contrast of existing disturbances, and the specific viewsheds affected, would depend upon the offsite areas reclaimed. The areas to be reclaimed would be agreed upon prior to BLM's Record of Decision.

4.8.1.1 Photograph Simulations

4.8.1.1.1 Simulation Process

1. Photograph simulations have been prepared to assess the potential visual impact of the Briggs Project. Photographs were taken at two representative viewpoints to serve as the base for the simulation. These viewpoints were specifically selected as locations where intervening topography and vegetation would not shield views, to present a "worst-case" analysis. The viewpoint locations are shown in Figure 3.8.1. The photographs are scaled to depict what the viewer would see with the unaided eye from the same viewpoint. Viewpoint No. 1 is representative of how the site would be viewed from the closest portion of Trona-Wildrose Road. Viewpoint No. 2 is provided to demonstrate a close-up view of the site, such as that which would occur from Wingate Road adjacent to the site.

2. The photographic simulations were prepared by: (1) compiling a digital file of the final site topography (i.e., mine pit, overburden piles, and leach pad) and the surrounding topography into a three-dimensional computer image; (2) scanning the site photographs into a computer; and (3) superimposing the site image onto the site photograph. Key control points (easily locatable features on the photographs and the topography map) were used to accurately place the image. Colors for the manmade features were estimated considering site-specific rock colors, and natural lighting and shadow effects.

4.8.1.1.2 Project Viewpoint No. 1

1. Figure 4.8.1 simulates the visual impact of the project from the closest point of Trona-Wildrose Road. Foreground views looking southeasterly are comprised of the sparsely

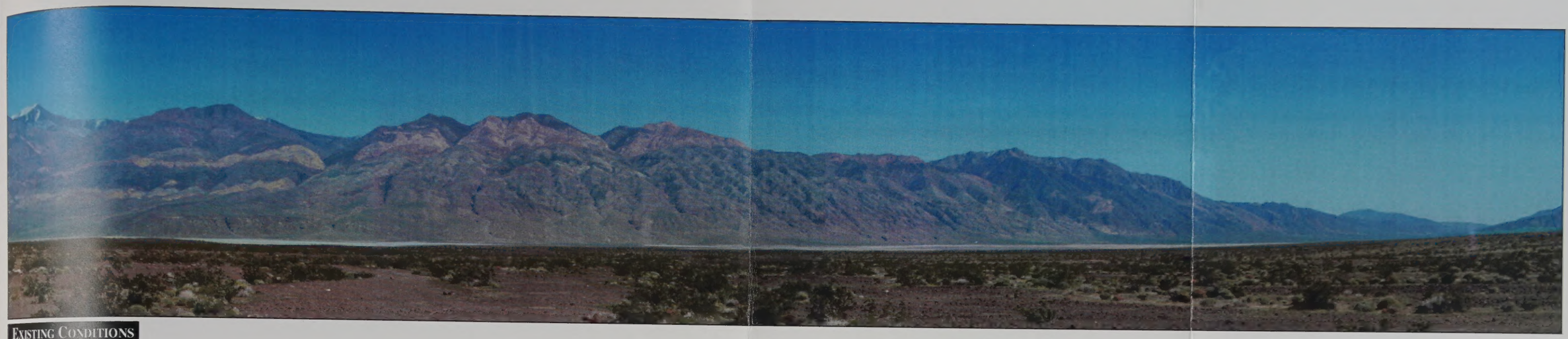
vegetated alluvial surface sloping downward from the viewing area. The expansive Panamint Range forms an impressive skyline in the background. The project site and playa surface are in the middle ground.

2. The primary elements of the project would be distinguishable at this distance, and would be noticed by some visitors to the valley. The more notable features would be the north waste rock pile, the pit highwall, and the heap leach pile. A small portion of the south waste rock pile would also be visible. The color contrast of these features would be similar to naturally occurring color contrasts of the rock uplands. The tabular form of the leach pad and waste rock piles would be similar to the low faulted terraces that occur naturally at the base of the mountains. However, the pile forms would be noticeable if a viewer happened to focus upon the site. Revegetation that would occur over time would help reduce the contrast. However, vegetation is not shown on site disturbances in the photographic simulations because the amount of revegetation expected over the short-term would not effectively reduce visual impacts.

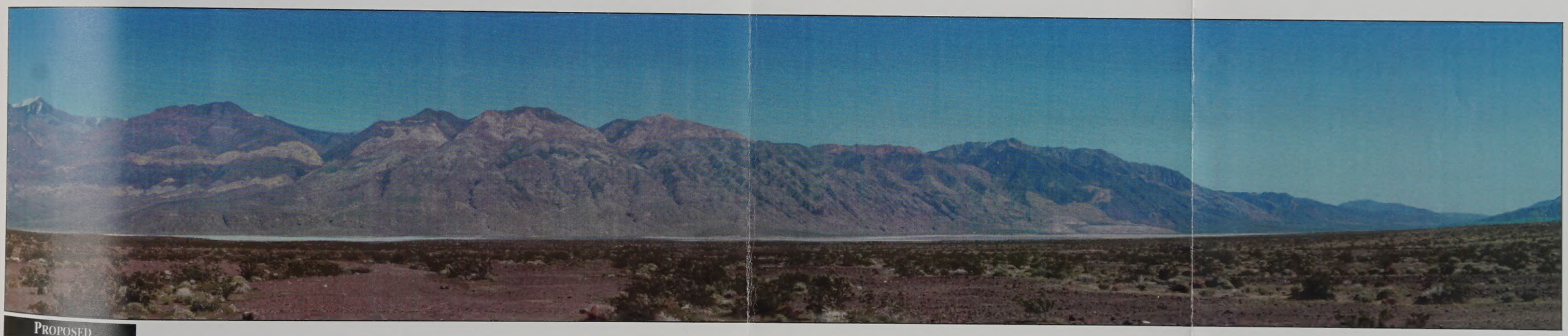
4.8.1.1.3 Project Viewpoint No. 2

1. Figure 4.8.2 simulates the visual impact of the project for proximal views. Project facilities would be observed as foreground or middle ground features, depending upon the specific viewing location, against a surrounding of the creosote bush scrub covered alluvial fan surface and rock uplands of the mountain front. For the view shown, the Slate Range appears at the right.

2. For proximal views along a short segment (i.e., about one mile) of Wingate Road, the project features would dominate views toward the direction of the site, at least during operations and for a few decades thereafter. Color of the piles and mine pit highwall in itself is not anticipated to result in stark contrast due to the variability and intensity of naturally occurring colors in rocks of the uplands. As discussed in Section 4.8.4, a program would be implemented to stain the mine pit highwall where unnatural visual contrasts occur. The contrast would also be limited because the tabular form of the piles would repeat the general form and line of the low faulted terraces and triangular-shaped facets of the mountain front. However, from proximal views the piles and pit highwall would remain noticeable to the casual observer for a considerable period of time following reclamation due to their "fresh" appearance. The repeated terraced nature of the mine pit highwall and waste rock pile benches would also result in a man-made appearance. The level of contrast that would occur would exceed BLM's management goals for the area. Therefore, this impact would be significant.



EXISTING CONDITIONS



PROPOSED

EXISTING CONDITIONS: View southeast from Trona-Wildrose Road. The Panamint Range dominates the landscape. The deeply incised Redlands Canyon and the site location at the canyon mouth are visible in the right-middle ground of the photograph.

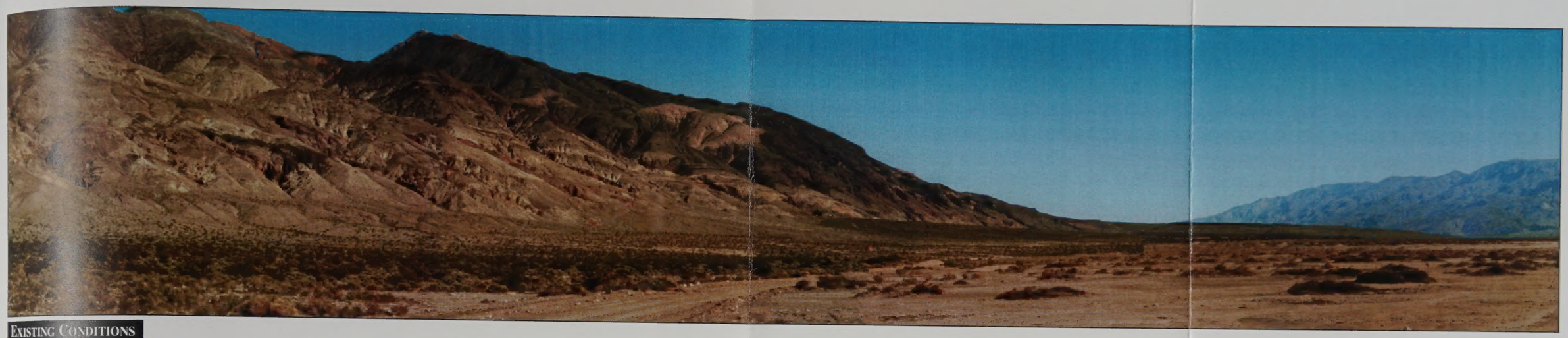
PROPOSED CONDITIONS: The mine pit high wall, north waste rock pile and heap leach pile would be visible in views toward the site area. View of the south waste rock pile is partially obstructed by the heap leach pile.

FIGURE 4.8.1

VIEWPOINT NO. 1

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EXISTING CONDITIONS



PROPOSED

EXISTING CONDITIONS: Proximal view of the site area from Wingate Road. The dominant visual form is the Panamint Range slopes. Striking natural color variations are evident on the sparsely vegetated and incised steep rock slopes. Existing exploration road cuts on the face of the slopes near Redlands Canyon (center) are visible, but result in a low level of contrast because of the natural lack of vegetation and rock color variations.

PROPOSED CONDITIONS: From this proximal view, the north waste rock pile is clearly visible protruding from the foot of the range. The mine pit highwall is partially obstructed from view by the north waste rock pile, but still visible. The leach pile is evident as a tabular disturbance to the gentle slope of the alluvial fan. The leach pile partially obstructs the view of the south waste rock pile.

FIGURE 4.8.2

VIEWPOINT NO. 2

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3. Over time, the waste rock piles would take on the appearance of the natural terraces that occur at the foot of the mountains where old alluvial surfaces have been faulted upward relative to the valley floor. Figure 4.8.3 shows some typical views of the natural terraces that occur in the area. The mine pit would remain noticeable from proximal views for many decades.

4.8.1.2 Views From Upland Areas

1. Figure 4.8.4 shows cross sections of the topography of the Panamint Range that were used to evaluate visibility of project site features from adjacent uplands of the Panamint Range. The location of the sections is shown in Figure 4.8.5.

2. The steep slopes of the lower part of the range limit views from the east. The eastern part of the site and the mine pit generally would not be visible from the east except from nearby areas. The westernmost portion of waste rock piles and leach pad would be the most visible features for views from the Panamint Range, and would be visible from some high points up to about two miles east of the site. This would allow some views of the site from isolated locations within the area proposed for the Manly Peak wilderness under the DPA. However, the rugged topography would conceal the site from view over most of the area. The wilderness area, if adopted, may be managed under BLM's strictest visual management standards, with the goal of maintaining contrasts such that they do not attract attention. Because of the small areas from where the site could be seen, none of which are common visitor destinations, and intervening topography screening most of the site, BLM's visual management goals would be met. Impact on the suitability of the area for wilderness would not be significant. The site would not be visible from DVNM. It also would not be visible from the area east of the site proposed to become Death Valley National Park under the DPA.

3. The site would be within field of view from parts of the northern end of Panamint Valley and the Slate Range and Argus Range bordering the west side of the valley. Section 4.7 addresses the anticipated visibility from WSAs, and areas proposed for wilderness and national park under the DPA. Project facilities would be visible to the casual observer from the proximal portion of the Slate Range WSA. The proximal portion of this WSA is not proposed for wilderness under the DPA. The site would not be visible from the portion of this WSA proposed for Death Valley National Park. The site would be visible from portions of the lands proposed for Death Valley National Park in the northern part of Panamint Valley, and from some WSA areas and proposed wilderness areas bordering the valley to the north and northwest. These views would be limited due to intervening topography and/or distance.

Where visible from these areas, the site would be a small part of the field of view and would not attract attention. The level of contrast would be within BLM's visual resource management goals, so impacts would not be significant.

4.8.1.3 Light and Glare

1. Operations at the site could occur up to 24 hours per day. Lighting would be required for safe operations.

2. The project site is remote. There are two known land uses in the site vicinity that are light-sensitive. The NPS has noted that natural darkness is a desired condition in all natural zones in DVNM (DVNM, 1993). Additionally, the area is used by military aircraft, including night operations and training exercises utilizing night-vision goggles. Project lights could also change the night character of the area for recreationalists and travelers through the valley.

3. Lighting would be shielded and directed downward to minimize the potential for "skyglow." There would be variable lighting requirements for the different site operations. Basic considerations include the size and shape of the area, mounting height of the lighting, and illumination requirements. For example, although low-sodium lights would reduce the potential for "skyglow," this type of lighting would not be appropriate for operations which require a high-degree of color recognition.

4. The western boundary of DVNM is located approximately 3.5 miles east of the project site and over a major mountain ridge. The project site is located about 4,000 to 9,000 feet below the ridgeline. Airborne concentrations of light-reflecting matter (i.e., dust, water vapor, etc.) are usually very low in the area as evidenced by the extremely high visibility (see Section 3.6). On occasions when elevated particulate levels do occur as discussed in Section 3.6, they primarily result from winnowing of desert soils by high speed winds. These elevated concentrations of dust decrease with distance above the ground surface. With the limited amount of lighting that would occur, shielding of lights that would be included as part of the Proposed Action, and low concentrations of light-reflecting matter, the potential for skyglow is expected to be low. Although some minor skyglow may be visible when moonless nights coincide with certain atmospheric conditions (e.g., elevated moisture or dust), the impact is not expected to be significant. Night visibility would be naturally reduced when conditions prone to skyglow occur.



Distal view of alluvial terraces (center and right center). These terraces vary in height up to about 560 feet. They are formed by vertical displacement of old alluvium upward in relation to the valley floor along faults.



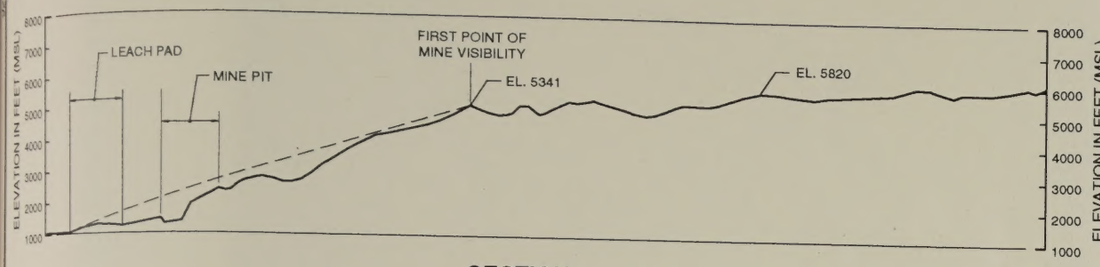
Proximal view of alluvial terraces (center, left center and right center). Linear nature of the scarps is evident.

FIGURE 4.8.3

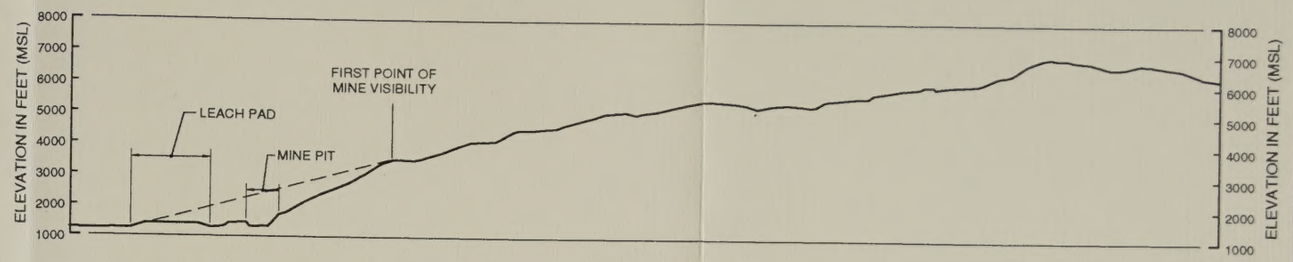
ALLUVIAL TERRACES NEAR BALLARAT

BRIGGS PROJECT

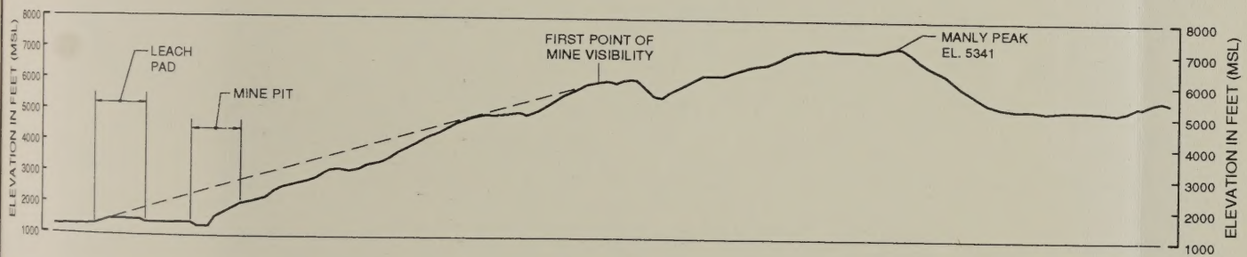
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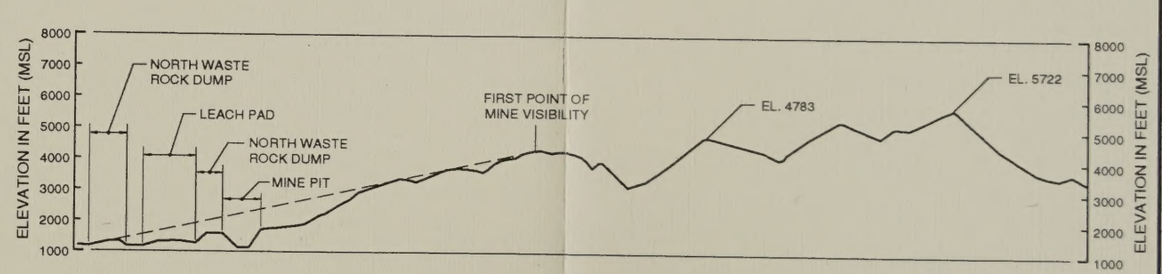
SECTION 1



SECTION 2



SECTION 3



SECTION 4

0 5,000 10,000 FEET

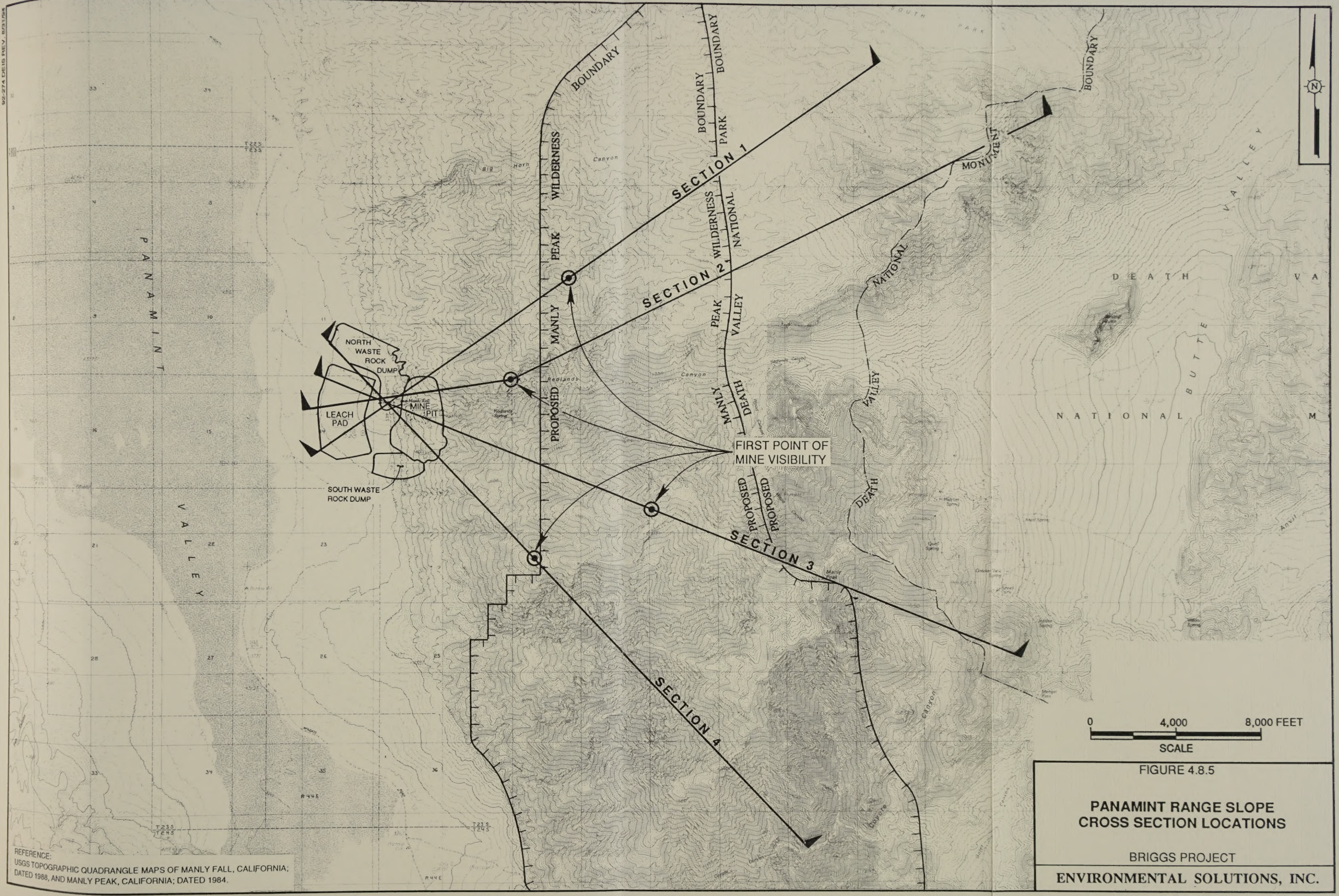
SCALE

FIGURE 4.8.4

PANAMINT RANGE SLOPE CROSS SECTIONS

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REFERENCE:
USGS TOPOGRAPHIC QUADRANGLE MAPS OF MANLY FALL, CALIFORNIA; DATED 1988, AND MANLY PEAK, CALIFORNIA; DATED 1984.

FIGURE 4.8.5

PANAMINT RANGE SLOPE CROSS SECTION LOCATIONS

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5. If visible skyglow does occur on occasion, its effects would depend upon viewing location. The potential for skyglow would be the lowest where intervening topography results in a skyline that is at a high angle above the viewer. For example, for recreationalists that may be present in upper Redlands Canyon or Butte Valley (immediately east of Redlands Canyon), the Panamint Range would severely block view of the night sky above the project vicinity and it is not likely that skyglow could be seen, regardless of atmospheric conditions. Where intervening topography is more distal, the angle of the skyline above the viewer is reduced, increasing the potential for skyglow to be seen. While it would have more potential to be visible under this condition, it would occupy an increasingly smaller portion of the horizon with increasing distance, counteracting any potential impact.

6. When moonless nights occur coincident with certain atmospheric conditions, minor skyglow may be discernible from portions of Death Valley and Panamint Valley, including some lands designated as WSA and proposed as wilderness or national park under the DPA (see Section 4.7). However, the magnitude of skyglow is expected to be low and not readily noticeable to the casual observer. Furthermore, the greatest potential for skyglow would occur when natural atmospheric conditions are adverse to night sky visibility. For these reasons, this impact is not expected to be significant.

7. Night lighting required for the project may be directly visible from portions of the Panamint Valley. Areas where night lighting may be directly visible would be those areas from which the site is visible as discussed in the previous sections. Where lighting can be seen, it would noticeably alter the character of the valley. Shielding of lights to direct them toward the ground would minimize this impact. With shielding, potential impacts to military flight operations in the area would not be significant. Because these impacts would only occur for a short period of time (i.e., six to eight years), the impact on the visual character of the area also would not be significant.

4.8.2 ALTERNATIVES

4.8.2.1 No Action Alternative

1. Implementation of the No Action Alternative would mean that the Proposed Action would not be developed. No increased potential for impact to visual resources would occur. Exploration disturbances for which Canyon is responsible would be reclaimed. There would be no offsite mitigation to reduce visual contrast of existing disturbances in the region.

4.8.2.2 Alternative Ore Beneficiation Rates

1. Under both the slower and faster ore beneficiation rate alternatives, the final project configuration and reclamation measures would be the same as under the Proposed Action. Long-term impacts of the site would not change. Overall, there would be an increase in the long-term impact to visual resources as compared to the Proposed Action, because there would be no offsite mitigation to reduce visual contrast of existing disturbances.

2. For the faster ore beneficiation rate alternative, there would be a reduction in short-term visual impacts because removal of project facilities, completion of reclamation activities, and return of the site to a passive state would occur approximately two years earlier. For the slower ore beneficiation rate alternative, there would be an increased short-term impact to visual resources because cessation of activities and reclamation to reduce visual contrast of site features would be extended approximately four years.

4.8.2.3 Reduced Project Size

1. Reducing the ore to be mined by approximately 30 percent would result in downsizing of most of the mine facilities. This would include the key visual elements of the mine pit, the waste rock piles, and the heap leach pad. Decreasing the size of these facilities would reduce the contrast of the facilities with the natural environment. The site features would become slightly less visible for distal views, but would still dominate proximal views toward the site. Visual impacts for proximal views would still exceed BLM's management criteria and, therefore would be significant. The long-term benefit of the reduced size of the mine pit, heap leach pad, and waste rock piles would be partially offset by the absence of offsite mitigation.

2. The reduced project size alternative would reduce the short-term visual impact of the project due to the shorter project duration. Removal of project facilities, completion of reclamation activities, and return of the site to a passive state would occur approximately two years earlier.

4.8.2.4 Balanced Waste Rock Piles

1. Visual impacts would be slightly reduced under this alternative compared to the Proposed Action. With the balanced waste rock piles, the north waste pile configuration would conform with natural topography to a much greater extent than under the Proposed Action, reducing the visual contrast of this feature for views from the Panamint Valley. In addition, the north waste rock pile would be closer to the mountain flank, reducing the visibility of the site from areas to

the east. These improvements would be partially offset by slightly increased visibility of the south waste rock pile and the mine pit highwall from areas to the north (e.g., Trona-Wildrose Road). The south waste rock pile would be larger, but its visual character would not change substantially. Other site features would be the same as for the Proposed Action. Photographic simulations of the balanced waste rock piles alternative are shown in Figure 4.8.6.

2. While the balanced waste rock piles alternative would reduce visual impacts as compared to the Proposed Action, contrast with surrounding conditions would still exceed BLM's management criteria. Therefore, the visual impact of the balanced waste rock piles alternative would also be significant.

3. Canyon has included the offsite mitigation discussed in Section 2.2.4 in this alternative, so there would be no change in benefit due to reclamation of existing disturbances.

4.8.2.5 Partial Backfilling

1. Under the partial backfilling alternative, short-term visual impacts of the project during operations and reclamation would be increased as compared to the Proposed Action. The north waste rock pile would be constructed with a slightly modified configuration (Figure 2.27) that would be more than 300 feet higher and encompass about 15 percent more acreage, notably increasing the visual contrast of the pile during operations. The mine pit, south waste rock pile, and heap leach pile, would be the same as for the Proposed Action.

2. The partial backfilling alternative would prolong return of the sites passive visual nature by about two years. During this time, the visual impacts of site activities and dust would continue. Because the time required for backfilling is estimated based on a material movement rate similar to operations, lighting would be needed, prolonging lighting impacts for an additional two years. However, lighting would be less than that occurring during mine operations.

3. Under the partial backfilling alternative, about 25 percent of the rock excavated from the mine pit would be backfilled. This would remove most of the south waste rock pile and the north waste rock pile would be made smaller. This reduction in the size of the waste rock piles would not result in a substantial reduction in visual contrast as compared to the Proposed Action because:

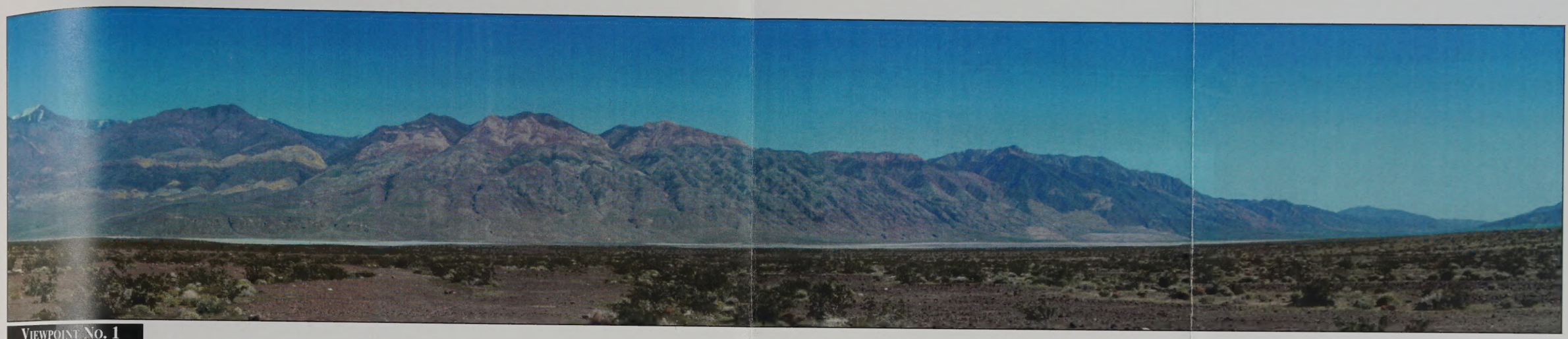
   - The remaining waste rock and heap leach piles would still comprise about 75 percent of the original pile volume (Figure 4.8.7).

- Disturbance would be readily visible where waste rock piles are excavated for backfilling. Surface disturbance over the entire pile footprints would create additional visual contrast for a period of decades until vegetation reestablishes and some weathering of the disturbed surface occurs. The surface disturbance scars would not be stained because these areas would have a soil-type texture, instead of a hard competent rock surface like the mine pit highwall. At the north waste rock pile, the surface disturbance scar would continue about 450 feet above the final pile top to a maximum elevation of about 1,950 feet. For comparison, under the Proposed Action, the maximum elevation of the north waste rock pile would only be about 1,600 feet. The modified north waste rock pile configuration under the partial backfilling alternative would also increase the area of surface disturbance by about 13 acres. At the south waste rock pile, the disturbed area would be the same as under the Proposed Action.
- The removal of material from the waste rock dumps for partial backfilling would increase visibility of the mine pit highwall, most of which would remain exposed under either the partial backfilling alternative or the Proposed Action. Only the lowermost portion of the pit highwall (which would not be generally visible) would be buried by partial backfilling. With the waste rock piles partially removed, there would be increased visibility of the pit wall from areas north and south of the project site.

4. After partial backfilling is completed, the shadow effect of low sun angles on the waste rock piles would be reduced, thereby diminishing definition of these features for some views. Over the long term, disturbed surfaces would become less visible due to weathering and recovery of the vegetation community. However, this would also be true under the Proposed Action. Terraced landforms occur naturally along the foot of the Panamint range as shown in Figure 4.8.3.

5. Any overall reduction in visual contrast due to partial backfilling would not be expected to occur for several decades or more, until surface disturbance scars weather and revegetate. When compared to the Proposed Action, long-term visual impact reduction that would occur due to the offsite mitigation plan would outweigh the visual resource benefits of the partial backfilling alternative.

6. Visual resource impacts may be reduced from south of the proposed project site, but this is not considered a primary viewpoint.



VIEWPOINT NO. 1



VIEWPOINT NO. 2

VIEWPOINT NO. 1: View southeast from Trona-Wildrose Road. Visibility of the north waste rock pile is less than for the Proposed Action because the pile contours conform with the existing topography of the mountain front. The south waste rock pile is largely obstructed from view, but extension of the pile to the southwest makes it more visible than the Proposed Action.

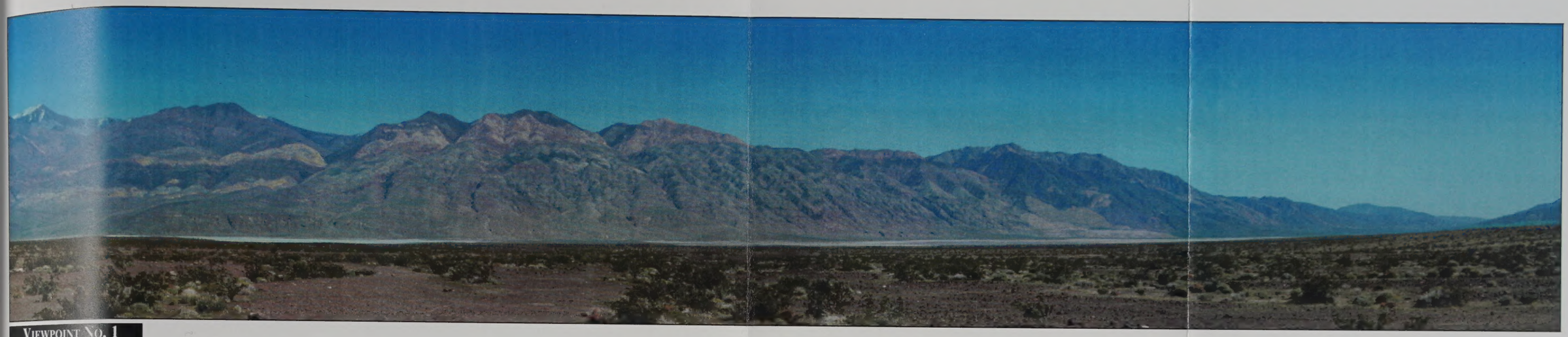
VIEWPOINT NO. 2: Proximal view of the site area from Wingate Road. The northern waste rock pile conforms with topography of the mountain slopes reducing its visibility as compared to the Proposed Action, but resulting in less obstruction of the view of the mine pit high wall. Visibility of the heap leach pad and south waste rock pile are not substantially changed as compared to the Proposed Action.

FIGURE 4.8.6

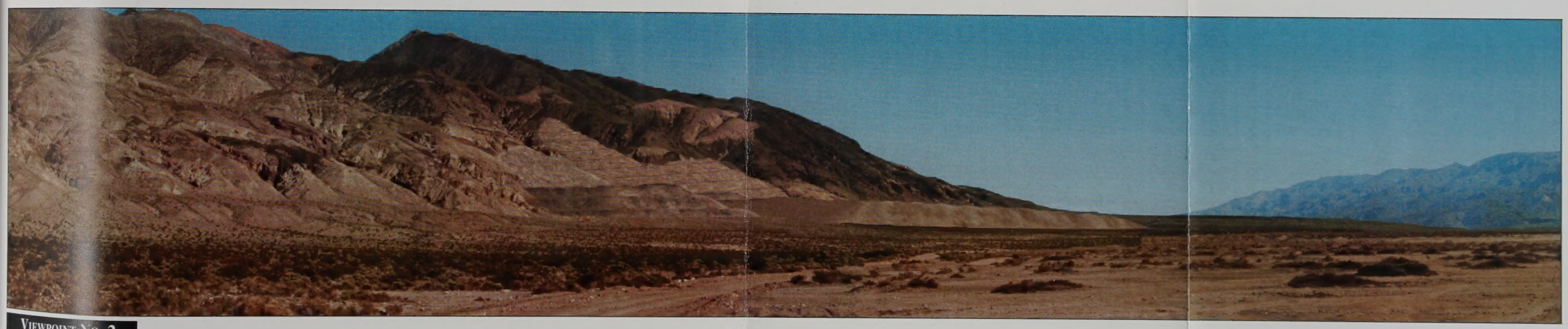
BALANCED WASTE ROCK PILE ALTERNATIVE VISUAL SIMULATIONS

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VIEWPOINT NO. 1



VIEWPOINT NO. 2

VIEWPOINT NO. 1: View southeast from Trona-Wildrose Road. Visual contrast of the heap leach pile would not change as compared to the Proposed Action. Partial removal of the north waste rock pile would make the mine pit highwall more visible. For a period of decades, until vegetation reestablishes, a scar due to surface disturbance would occur at the south waste rock pile footprint and up to about 450 feet above the remaining portion of the north waste rock pile.

VIEWPOINT NO. 2: Proximal view of the site area from Wingate Road. Effects for this view as compared to the Proposed Action would be generally the same as discussed for Viewpoint No. 1, but the magnitude of differences in visual contrast would be greater due to the proximal view.

FIGURE 4.8.7

PARTIAL BACKFILLING ALTERNATIVE VISUAL SIMULATIONS (AFTER BACKFILLING)

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4.8.3 REGULATORY REQUIREMENTS THAT LIMIT PROJECT IMPACTS

1. The 43 CFR 3809 regulations and SMARA define standards for reclamation of mining operations. These standards include procedures that would result in beneficial visual reclamation including reshaping and revegetation of disturbed areas, where appropriate. Canyon would be required to implement a comprehensive site reclamation plan in accordance with these regulations.

4.8.4 MITIGATION MEASURES INCORPORATED BY PROJECT DESIGN

1. The following mitigation measures are incorporated by project design to minimize visual impacts:
   - Surface disturbance would be minimized to that required for safe and efficient operation. Disturbed areas not planned for future use would be promptly reclaimed.
   - Buildings and structures would be painted with non-reflective earth tone colors to blend with the predominant background.
   - Dust control measures would be employed as discussed in Section 4.6 to reduce the potential visual impact of fugitive dust.
   - Outdoor lighting for the mine pit and other areas of nighttime activities would be shielded and directed downward to reduce fugitive light and light poles would be as short as practical. Low pressure sodium bulbs would be used for outdoor lighting where practical to reduce the potential for night sky impact. Canyon would submit a lighting plan for night operations to BLM and the County to document compliance with these measures.
   - All buildings, equipment, supplies, piping and debris, would be removed from the site upon completion, in conformance with the reclamation plan. Foundations would be broken and removed from the site or buried in accordance with procedures acceptable to BLM and the County. Underground utilities would be capped below grade.
   - To the extent practical, disturbed areas would be regraded to blend with the surrounding terrain and revegetated, in conformance with the reclamation plan.
   - Leach pile slopes would be graded during reclamation to facilitate revegetation and reduce the linear appearance. The final overall slopes would be about 3H:1V. Potholes and other slope aspect variations would be provided.
   - The faces of waste rock piles would be recontoured to break up straight lines and reduce the man-made appearance. The tops and benches of the waste rock piles would be prepared with growth media and seeded to enhance revegetation.
   - Final mine pit walls would be stained where required to reduce visual contrast with surrounding areas. Because of the natural color contrasts of the exposed rock in the Panamint Range, some areas of the pit walls may not benefit from staining. Canyon would develop a program acceptable to BLM and the County for quantifying the level of contrast and defining areas to be stained. ~~(e.g., based on Munsol color chart variations).~~

2. These mitigation measures would also be implemented for project alternatives, except the No Action Alternative. For the No Action Alternative, no mitigation would be required.

4.8.5 RESIDUAL IMPACTS

1. Because of the scale of surface disturbance and topographic modifications, the project would have an unavoidable visual impact. The impact would occur primarily due to the waste rock piles, the heap leach pile and the mine pit highwall. The topographic drop at the mouth of Redlands Canyon known as Manly Fall would be removed by excavation of the mine pit. Additionally, during operations, buildings and equipment would also be visible from proximal views. Lighting would be shielded to the extent practical but it is expected that some lighting may be visible from surrounding areas and Trona-Wildrose Road. Dust from project operations, which could be visible from surrounding areas, would be controlled using BACT measures. The Proposed Action does not however, include dust control measuring for the project access road. During shift changes, visual impacts of dust from the access road could be significant.

2. While the number of persons visiting the area is relatively limited, it is recognized that some of these potential receptors are in the vicinity for the primitive characteristics and solitude. These receptors would be sensitive to visual contrasts of the project. The level of contrast of the mine site would exceed BLM's visual management goals for the area from proximal views. Therefore, the visual impact of the project would be considered significant.

3. The project would also result in the potential for minor skyglow when moonless nights coincide with certain atmospheric conditions. However, the greatest potential for skyglow would be during conditions when night sky visibility is naturally reduced. Skyglow, if visible, is not expected to significantly affect the night characteristics of the area.

4.8.6 MITIGATION MEASURES TO REDUCE RESIDUAL IMPACTS

1. As discussed in Section 4.8.5, substantive changes to site topography are unavoidable, and related contrasts to existing visual resources would be significant during operations and for several decades thereafter until vegetation is reestablished and other natural processes subdue the fresh appearance of these disturbances. The reclamation plan includes measures to reduce the visual contrast of the site. The measures proposed by Canyon during operations and

reclamation include minimizing disturbance to the land surface, staining of the mine pit highwall, regrading sharp features of the heap leach and waste rock piles, controlling onsite dust, shielding of lights, and other measures as discussed in Section 4.8.4. These proposed measures encompass the majority of practical mitigation efforts available. However, a few additional mitigation measures are recommended, as discussed in the following paragraphs.

3. A portion of the visibility contrast that would occur would be due to the lack of vegetation on disturbed surfaces. Expediting natural revegetation of the site, therefore, would reduce visual impacts of project implementation. Reclamation measures that may be successful for increasing the rate of natural revegetation over time as compared to the Proposed Action are recommended in Section 4.4.6. These measures include:
   - Salvaging of some native plants from areas to be disturbed, and maintaining these plants in an onsite nursery.
   - Conducting efforts to attempt germination and growth of plants in the nursery from seeds obtained from the site vicinity and from cuttings, if possible.
   - Transplanting of nursery specimens to disturbed surfaces during reclamation.
   - Placement of large rocks dispersed over disturbed surfaces to provide some diversity, cover for small animals, and potential shade for seedlings.

   If transplanting of live plants into disturbed areas is successful, short-term visual impacts of the Briggs Project would be slightly reduced, but more notably, natural reestablishment of vegetation may be accelerated. Transplanted vegetation, and habitat diversity offered by placement of rocks, would increase attraction of the site to birds, insects, reptiles and rodents, which bring in seeds, pollen and detritus. These effects would be expected to speed up succession of the plant community, thereby reducing the term of visual impacts caused by vegetation disturbance.

4. Canyon should also control dust on the access road by treating the road surface with an emulsion compound, as discussed in Section 4.6.6.

5. Because visual impacts of the project would be significant, CEQA provides the authority for the County to require these measures. BLM resource specialists recommend that these measures also be adopted as conditions of the Plan of Operations, if approved, to avoid unnecessary or undue degradation of federal lands.

6. Implementation of the mitigation measures recommended in this section and mitigation measures proposed by Canyon as discussed in Section 4.8.4 would minimize visual impacts to the extent practical consistent with CEQA and NEPA regulations. Although the additional recommended reclamation measures would reduce visual impacts of the project, the level of contrast of the mine site would still exceed BLM management policies for the area from proximal views. Therefore, visual impacts would still be significant. The visual impact of dust from the access road would be mitigated to a level that is less than significant through use of an emulsion compound (see Section 4.6.6).

7. The additional recommended mitigation measures discussed in this section would be applicable to the Proposed Action or any of the alternatives except the No Action Alternative.

4.9 CULTURAL RESOURCES

1. This section provides an analysis of impacts to cultural resources that could result from implementation of the Briggs Project or alternatives. Mitigation measures to reduce impacts to significant cultural resources are also provided in this section. Consistent with CEQA's provision for projects requiring federal approvals, federal guidelines (36 CFR Part 800) were used to determine if the Proposed Action has the potential to significantly affect the cultural environment. An inventory of the cultural resources of the project area is provided in Section 3.9, with potentially significant sites identified. As discussed in Section 3.9, scoping for this Draft EIS/EIR and BLM consultation with local Native American tribes has not revealed any Native American concerns in the project area.

2. Project-related activities that involve land alteration have the potential to affect significant cultural resources, as does increased human presence in the project area and vicinity, and the development/improvement of roads, which facilitates access to sites in the project vicinity. The following activities would be considered significant if they were to occur:
   - Destruction of a significant cultural resource.
   - Disturbance of those heritage values within a resource that gives the property its significance.

3. Significant cultural resources are those that are determined to meet the eligibility criteria for listing in the NRHP. Potentially significant resources in the Briggs Project area include sites CA-INY-4643, ~~and~~ CA-INY-4644, and CA-INY- 4814-H. A ~~third~~ fourth resource, segments of the historic route of the Bennett-Arcan Party led by William Manly, did not retain the qualities of integrity stated at 36 CFR Part 60.4 as being essential to National Register eligibility (Mehls and Lennon, 1993). Manly Fall, while named for the adventurer, is a geomorphic feature and does not possess cultural resource heritage values.

4.9.1 PROPOSED ACTION

1. The following potential impacts to cultural resources could occur due to the Proposed Action if mitigation measures were not implemented:
   - Land-altering activities have the potential to disturb or destroy sites CA-INY-4643 and CA-INY-4644.
   - Increased human presence, through establishment of an onsite work force, could facilitate recreational collection of artifacts, which destroys their scientific value and the heritage value of a cultural resource.
   - The presence of the Briggs Project as a potential point of interest could increase nonmine-related human presence in the vicinity and associated recreational activities by the public, including artifact collection in the project vicinity and elsewhere in the region accessible by the road network.

2. Under the Proposed Action, sites ~~of~~ CA-INY-4643 and CA-INY-4644 would be avoided. The site layout has been designed so that the vicinity of these features would not be disturbed. The Proposed Action includes fencing sites CA-INY-4643 and CA-INY-4644 at the onset of construction to provide assurance that these resources are protected from surface disturbances. Additionally, Canyon would provide instruction to site employees regarding the sensitivity of these resources and the presence of laws against illegal artifact collection, and would also provide for monitoring of significant cultural resources on a semiannual basis. With these measures, potential impacts due to onsite surface disturbances and employees would be avoided. Site CA-INY-4814-H would not be affected by the Proposed Action, as the cultural resource is located outside the project boundary and outside the proposed area of surface disturbance. Canyon would include reference to this site in its instruction to site employees regarding protection of cultural resources.

3. The Proposed Action includes excavation of a borrow pit in one of three areas, two of which are located offsite. The two potential offsite borrow areas (and an associated access route) have been surveyed for cultural resources with negative results (Lennon, 1993b). Therefore, location of the borrow pit, whether onsite or in either of the two offsite locations, would not result in impacts to significant cultural resources.

4. The site area is currently accessible via Wingate Road. The Proposed Action does not include straightening or widening of this access route. The primary limitation to site access is the remote nature of the site from population or recreation centers. Due to this characteristic and the minimal access improvement that would occur (maintenance and surface grading of the existing road), substantial increases in nonmine traffic into the area are not expected. Therefore, the potential for effects to occur to cultural resources is expected to be minimal.

4.9.2 ALTERNATIVES

4.9.2.1 No Action Alternative

1. Under the No Action Alternative, the cultural resource environment would remain as it currently exists, with the primary threat to resource integrity occurring from natural erosion processes and use of the area for recreation. Adverse impacts to cultural resources would not result from the No Action Alternative, and mitigation measures would not be required.

4.9.2.2 Alternative Ore Beneficiation Rates

1. Potential effects to significant cultural resources would be the same for this alternative as for the Proposed Action. The same amount of land-altering activities in the same locations would occur. Similar to the Proposed Action, sites CA-INY-4643 and CA-INY-4644 would be fenced for their protection and avoided during site development and project operation; site CA-INY-4814-H would be outside the project boundary and would not be disturbed.

4.9.2.3 Reduced Project Size

1. Reduced project size would result in an approximate 20 percent reduction in the surface area that would receive land-altering activities. Potential effects to significant cultural resources, however, would be the same as those for the Proposed Action because sites CA-INY-4643 and CA-INY-4644 would still be located in open space, and would be fenced for their protection and avoided during site development and project operation; site CA-INY-4814-H would be outside the project boundary and would not be disturbed.

4.9.2.4 Balanced Waste Rock Piles

1. Under this alternative, the north and south waste rock piles would be reconfigured. As ~~for~~ with the Proposed Action, the two potentially significant onsite cultural resources, sites CA-INY-4643 and CA-INY-4644, would be fenced for their protection and avoided during site development and project operation. Similar to the Proposed Action, no significant impacts to these cultural resources are expected to occur under this alternative.

2. ~~The balanced waste rock piles alternative expands the project site in two limited locations relative to the Proposed Action. These small areas have not been inventoried for cultural resources, a requirement that would have to be completed if this alternative were selected for implementation.~~ Under the balanced waste rock piles alternative, the south waste rock pile would be constructed in proximity to site CA-INY-4814-H. The minimum distance between the periphery of site CA-INY-4814-H and the waste rock pile would be approximately 60 feet. To protect site integrity and preclude unintentional trespass or disturbance, Canyon would establish a physical barrier at the boundary of the south waste rock pile where it is proximal to site CA-INY-4814-H. This barrier would be comprised of two earthen berms. The first berm would be placed during initial facilities development at the outer edge of the waste rock pile. The second berm would be constructed at the top perimeter of the first waste

rock pile lift, after placement of the lift material. This berm would provide additional protection from equipment excursions and loose material that may roll down the face of the lift. Both berms would be reclaimed upon mine closure.

3. Site monitoring and worker education mitigations would be similar to those for sites CA-INY-4643 and CA-INY-4644. Site CA-INY-4814-H would be monitored on a semiannual basis by a qualified archaeologist, and the property would be included in instructions to site employees concerning the sensitivity and management of cultural resources.

4.9.2.5 Partial Backfilling Alternative

1. The potential impacts to cultural resources are the same under this alternative as they are for the Proposed Action, since land alterations would be limited to approximately the same areas. Potential effects to significant cultural resources also would be the same ~~as those of the Proposed Action~~ because sites CA-INY-4643 and CA-INY-4644 would be fenced and avoided during site development and project operation, and site CA-INY-4814-H would be outside the project site boundary and, therefore, outside the area of disturbance.

4.9.3 REGULATORY REQUIREMENTS THAT LIMIT PROJECT IMPACTS

1. Cultural resource concerns for the Proposed Action and alternatives are regulated by the 36 CFR Part 800 regulations, which implement Section 106 of NHPA. BLM is the lead agency for completing regulatory requirements. NHPA established the following:
   - Expansion of the NRHP, to be maintained by the Secretary of the Interior.
   - Position of the SHPO.
   - Establishment of the ACHP.

   Section 106 of NHPA requires federal agencies to provide the SHPO and ACHP an opportunity to comment on federally funded, licensed, or permitted actions that have the potential to affect properties included or eligible for inclusion in the NRHP. The eligibility criteria are listed in 36 CFR Part 60, "National Register of Historic Places" (see Section 3.9.2.2 for a complete listing of these criteria).

2. The ACHP regulations, "Protection of Historic Properties" (36 CFR Part 800), outline the procedures for federal agencies to follow in completing Section 106 compliance. Federal agencies are required to consult with the SHPO to determine if NRHP-listed or -eligible properties can be affected by a proposed action. If such properties are present, the federal

agency consults with SHPO on whether the proposed action would affect the historic property or properties. If there could be an effect, the Criteria of Adverse Effect are applied to determine if the effect could be adverse. Treatment measures are developed for resources that would be adversely affected by a proposed action. The treatment program is reviewed by SHPO and ACHP, and comments are provided to the federal agency. The ACHP regulations encourage participation by local governments, Native American tribes, and the public.

3. BLM plans to complete Section 106 consultation for cultural resources that could be affected by the Proposed Action prior to issuance of the Record of Decision. Summary documentation for consultation will be submitted to SHPO by BLM in September 1994 (Fowler, 1994). The regulatory requirements of 36 CFR Part 800 will be completed by BLM in consultation with SHPO and ACHP, as necessary to satisfy the requirements of NHPA and FLPMA. Consultation will address the following issues, as necessary:
   - Determination of resource significance, as assessed by a site's potential to meet the requirements for National Register listing.
   - Determination of the potential for the Proposed Action to result in effects or adverse effects to significant cultural resources.
   - Preparation and implementation of a treatment plan, as needed, designed to offset potential adverse effects to significant resources.

   BLM anticipates SHPO concurrence in NRHP eligibility evaluations and expects that a Determination of No Effect will be the outcome of the Section 106 consultation process. The Section 106 compliance process will be completed prior to the Record of Decision for the Proposed Action.

4. The NRHP eligibility evaluations made by BLM have been provided in Table 3.9.1. In summary, two sites (CA-INY-4643 and CA-INY-4644) recorded in the area of potential effect demonstrate potential eligibility for National Register listing due to their information potential (criterion 36 CFR Part 60.4[d]). The Proposed Action includes fencing of these sites and provides for in-place preservation of the resources. Documentation concerning resource eligibility and determination of effect or adverse effect is scheduled by BLM for submission to SHPO in September 1994.

4.9.4 MEASURES INCORPORATED BY PROJECT DESIGN

1. The following mitigation measures are incorporated by project design to control collection or disturbance of significant cultural resources:
   - Fencing of sites CA-INY-4643 and CA-INY-4644. These two rock alignment/rock feature sites and associated trail segments would be fenced to preclude unintentional trespass or disturbance of the resources during

project development and operation. The Plan of Operations states the intent to avoid these resources, and the establishment of the fence would assure that the intent of the Plan of Operations is implemented in project design. The fence around each resource would be established as a first step activity in the initial stage of facilities development. The boundary of each fenced area would be established in consultation with a professional archaeologist and BLM.

- Monitoring of sites CA-INY-4643 and CA-INY-4644 on a semiannual basis. These resources would be monitored by a qualified archaeologist to assure that unanticipated impacts to the resources (e.g., erosion) are identified and potential treatments, if necessary, developed.
- Instruction of construction contractors and operations personnel regarding the sensitivity of cultural resources and the presence of laws against unauthorized collection or disturbance. Canyon would provide this worker education program. Appropriate personnel would be instructed that surface disturbance must cease immediately in any area where an unknown cultural resource is discovered. Activities would cease in the discovery area until the requirements of 36 CFR Part 800.11 are met, including resource evaluation by a qualified archaeologist.

2. These measures would also be implemented for the reduced project size, alternative ore beneficiation rates, and partial backfilling alternatives.

3. Mitigation measures for cultural resources for the balanced waste rock piles alternative would be the same as those for the Proposed Action with the addition of the following:

- ~~Inventory and evaluation of cultural resources in the portions of the alternative project site north and south of the original cultural resource study area (Rusco et al., 1993). The effort would meet BLM Class III standards for a cultural resource inventory.~~
- Avoidance of site CA-INY-4814-H, the Goldtooth Mine and Mill complex, during site development and project operation. The minimum distance between the periphery of site CA-INY-4814-H and the waste rock pile would be approximately 60 feet. To protect site integrity and preclude unintentional trespass or disturbance, Canyon would establish a physical barrier at the boundary of the south waste rock pile where it is proximal to site CA-INY-4814-H. This barrier would be comprised of two earthen berms. The first berm would be placed during initial facilities development at the outer edge of the waste rock pile. The second berm would be constructed at the top perimeter of the first waste rock pile lift, after placement of the lift material. This berm would provide additional protection from equipment excursions and loose material that may roll down the face of the lift. Both berms would be reclaimed upon mine closure.

~~Section 106 consultation would proceed from this point in the same manner as that described for the Proposed Action.~~

4. Implementation of the No Action Alternative would eliminate the potential for project-related effects to occur to cultural resources. No mitigation measures would be necessary.

4.9.5 RESIDUAL IMPACTS

1. Unavoidable residual impacts to cultural resources are not expected to occur as a result of the Proposed Action or alternatives. The delineated mitigation measures are fully implementable and feasible for the Proposed Action and alternatives. Significant cultural resources, or the data they contain, would be adequately protected by completion of the Section 106 process, as regulated by 36 CFR Part 800.

4.10 TRANSPORTATION

1. Increased traffic on roads leading to the site would occur as a result of project implementation. This impact would be considered significant if design capacities of roads were to be exceeded, necessitating unplanned upgrading of road systems, or if unnecessary safety hazards were imposed.

2. As discussed in Section 2.2.2.5, it may also be necessary to haul fine-grained borrow material from the playa to the site for liner construction if adequate material cannot be obtained onsite. If this occurs, hauling of borrow material along Ballarat Road and/or Wingate Road would be required. Transportation effects of hauling borrow material would be considered significant if the hauling would substantially increase County maintenance requirements for these roads or create a substantial traffic hazard.

4.10.1 PROPOSED ACTION

4.10.1.1 Routine Operations and Initial Construction Traffic

1. Traffic volumes on the roadways in the vicinity of the Briggs Project site would increase during both the construction and operations phase of the project. Project-related traffic would use Trona-Wildrose Road. As discussed in Section 2.2.2, project-related traffic for operations is expected to result in an increase of about ~~130~~ 90 one-way trips per day (~~65~~ 45 round trips). This estimate is ~~for commuting employees and routine deliveries for normal weekday conditions~~ an average. Traffic on weekends would be less. This traffic estimate is based on some ridesharing to the site and allows for an average of between two and three employees per vehicle. Ridesharing is expected due to the remote location of the site, the relatively small population centers from which employees will be commuting, the common hours of employee shifts, and the unsurfaced roads that must be traveled.

2. The number of trips for construction personnel, equipment and supplies would vary over the six- to eight-month period of construction. For a short time (e.g., one or two months), when construction activities are at a maximum level, daily traffic may approach twice the normal operating traffic level, or about ~~260~~ 180 one-way trips (~~130~~ 90 round trips) on average, per day.

3. Traffic volumes from the Proposed Action would not have a notable adverse impact on Trona-Wildrose Road since current volumes are very low (ADT 215). The project would increase traffic on Highway 178 near Ridgecrest by about 5 percent during operations, and up to about 10 percent for a short period during construction. The current traffic volume on

this road near Ridgecrest is 70 to 80 percent of the road capacity, with less traffic further from Ridgecrest (Walton, 1993). The additional traffic would not cause the road capacity to be exceeded. The closest town to the Briggs Project site is Trona, located about 34 road miles from the site. Traffic in Trona is normally light. Because of the distance from the site, it is expected that project-related traffic would be sufficiently spread out in the Trona area, so that it would not cause significant delays for pulling onto the highway in the Trona area. Because road capacities would not be exceeded and substantive congestion is not expected, the volume of additional traffic, in and of itself, would not be significant.

4. For most of the route along Highway 178 and Trona-Wildrose Road to the project area, roads are relatively straight and driving conditions (e.g., visibility) are good. At the Slate Range crossing, however, the road is deceptively steep and there are sharp corners that require reduced speeds for safe travel. Large trucks that would travel to the project site to deliver equipment and supplies could create a significant hazard on this road if safety measures are not taken. Section 4.10.6 discusses recommended measures to reduce the potential for safety hazards to a level of less than significant.

5. Project-related travel over Ballarat and Wingate roads could increase maintenance requirements for these roads. Canyon intends to enter into a road maintenance agreement with the County for these roads that would mitigate this impact to a level that is less than significant. Dust on these roads would, however, create a significant safety hazard during shift changes. Dust generated by vehicles could limit visibility when numerous vehicles travel in succession. Section 4.10.5 discusses recommended measures to mitigate this hazard to a level that is less than significant.

6. There is one residence along the access route to the project, located ~~within the historic mining town of~~ at Ballarat. The increase in traffic along Ballarat Road that would occur as a result of project implementation is likely to have a notable effect on this residence.

7. Construction and operation of the project would require deliveries of large equipment. Oversize loads would occur primarily during the construction and initial startup phases, and again during decommissioning. During operations, oversize loads would be infrequent. Delivery of oversize loads would occur in accordance with applicable transportation regulations which include requirements for permits, flagging, signs, escorts and other safety measures. Required state and County permits for oversize loads would be obtained. Oversize loads, as well as supply deliveries and normal employee transportation, would result in wear and tear to roads. The related potential for road maintenance would be mitigated through

normal tax and revenue channels as discussed in Section 4.12. With these revenue channels in place, and considering the short life of the project, the impacts of wear and tear to road surfaces would not be significant.

8. Some project employees may elect to use the Caltrans Park & Ride facility on Highway 178 in Ridgecrest. As discussed in Section 3.10, this lot currently fills beyond capacity, resulting in some patrons parking in unimproved areas. Use of the park & ride by project employees would increase the level of use of unimproved areas, adding to the need for expansion of this facility. This impact would be mitigated to a level that is less than significant through normal tax and revenue channels.

4.10.1.2 Transport of Borrow Material

1. Transportation impacts due to clay borrow for liner construction would depend upon which of the borrow locations discussed in Section 2.2.2.5 is utilized. If borrow is obtained onsite, the impacts of truck traffic on Ballarat and/or Wingate roads that are discussed in this section would not occur. The impacts that would occur if the onsite borrow area is utilized would be within those described for project construction and operations in other parts of this document.

2. Borrow of fine-grain material is expected to occur in about three phases, each involving approximately 100,000 cubic yards of material. The first phase would occur at the time of initial project construction activities. The final phase may occur up to five years after initial construction, depending on the details of pad construction scheduling. The second phase would be intermediate to these. Each phase would take about 50 to 60 working days. Borrow hauling could occur up to seven days per week. The anticipated schedule includes hauling 16 hours per day. However, operations could occur during some periods up to 24 hours per day. Hauling is expected to occur using 20- to 30-ton capacity vehicles. Truck and trailer rigs or scrapers may be used. About 5,300 to 8,000 round trips would be required for each phase. It is anticipated that haul traffic would consist of about seven to ten round trips per hour.

3. Hauling equipment would be loaded off the road at the borrow area. If the north borrow area is used, transport would occur over an approximately 0.75 mile segment of Ballarat Road and over Wingate Road between Ballarat Road and the project site (Figure 2.20). If the south borrow area is used, transport over an approximately 0.5-mile segment of Wingate Road would occur. A road grader would be available full time during hauling operations and the road surface would be kept in good condition.

4. A combination of dust palliatives and road watering would be used to minimize dust generation and alleviate the associated hazard of impaired visibility.

5. Signs would be posted to alert other road users of haul traffic and a speed limit of 25 mph would be established for the hauling vehicles. In addition, if the south borrow area is used, flaggers would be stationed on Wingate Road immediately north and south of the construction travel zone during hauling operations.

6. With the road maintenance, and dust control and other safety precautions incorporated into the plans for offsite borrow, it is anticipated that these activities can occur safely and without notable impact to road surfaces or County maintenance requirements. The primary impact to transportation due to these activities would be reduced speeds for travelers utilizing the same road as construction traffic. This impact is considered minor because of the low level of use of these roads and the short duration of borrow activities.

4.10.2 ALTERNATIVES

4.10.2.1 No Action Alternative

1. The No Action Alternative would mean that the Proposed Action would not be developed. There would be no traffic increase related to the Briggs Project.

4.10.2.2 Alternative Ore Beneficiation Rates

1. A 50 percent decrease in the ore beneficiation rate would result in a smaller number of employees and deliveries to the site, with a corresponding decrease in the average daily project-related traffic. However, project-related traffic would occur over a period of time approximately four years longer than for the Proposed Action.

2. A 50 percent increase in the ore beneficiation rate would result in a larger number of employees and deliveries to the site, with a corresponding increase in the average daily project-related traffic. However, project-related traffic would occur over a period of time approximately two years shorter than the Proposed Action.

3. The difference in the project-related ADT for these alternatives is estimated to be on the order of a 10 to 15 percent decrease and increase, respectively (assuming 50 percent change in

supply deliveries and about 10 percent change in staff vehicles). The difference in project-related traffic impacts attributable to these alternatives, as compared to the Proposed Action, would be minor. A road agreement with the County for maintenance of Ballarat and Wingate roads would still be required to offset project-related traffic impacts. Safety hazards related to traffic on the Slate Range crossing and dust from the access road traffic would still be significant unless mitigated.

4.10.2.3 Reduced Project Size

1. The smaller project size, maintaining the processing rate the same as for the Proposed Action, would shorten the term of project-related traffic impacts by about two years as compared to the Proposed Action. The ADT count and related impacts would not change except for their duration. A road agreement with the County for maintenance of Ballarat and Wingate roads would still be required to offset project-related traffic impacts. Safety hazards related to traffic on the Slate Range crossing and dust from the access road traffic would still be significant unless mitigated.

4.10.2.4 Balanced Waste Rock Piles

1. The optimized project configuration would not change project-related traffic impacts as compared to the Proposed Action.

4.10.2.5 Partial Backfilling

1. For the partial backfilling alternative, traffic impacts during project construction and operations would be the same as for the Proposed Action. A road agreement with the County for maintenance of Ballarat and Wingate roads would still be required to offset project-related traffic impacts. Safety hazards related to traffic on the Slate Range crossing and dust from the access road traffic would still be significant unless mitigated.

2. The partial backfilling alternative would result in traffic impacts being prolonged by about two years as a result of fuel and oil deliveries to the site and transport of employees for the backfilling operation. The traffic impacts for the two year period of backfilling would be minor and would not represent a substantial change to overall traffic impacts of the Proposed Action.

4.10.3 MITIGATION MEASURES INCORPORATED BY PROJECT DESIGN

4.10.3.1 Routine Operations and Initial Construction Traffic

1. The primary mitigation measure incorporated by project design for routine traffic impacts would be an agreement with the County entered into by Canyon for maintenance of Ballarat and Wingate road surfaces. The intent of this agreement would be to offset increased maintenance requirements for these roads that could occur as a result of project implementation. Normal use of paved roads and the park & ride facility would be compensated through standard taxes and revenues as discussed with other socioeconomic aspects of the project in Section 4.12.

2. These measures would also be implemented for project alternatives, except the No Action Alternative. For the No Action Alternative, the project would not be implemented and, therefore, no mitigation would be required.

4.10.3.2 Transport of Borrow Material

1. Mitigation measures incorporated by project design to minimize transportation effects of offsite borrow include the following:
   - A combination of dust palliatives and road watering would be used to minimize dust generation and alleviate the associated hazard of impaired visibility.
   - Signs would be posted to alert other road users of haul traffic.
   - A speed limit of 25 mph would be established for haul traffic.
   - A road grader would be available full time during hauling operations and the road surface would be kept in good condition.
   - If the south borrow area is used, flaggers would be stationed on Wingate Road immediately north and south of the construction travel zone during hauling operations.

2. These measures would also be implemented for project alternatives, except the No Action Alternative. For the No Action Alternative, the project would not be implemented and, therefore, no mitigation would be required.

4.10.4 RESIDUAL IMPACTS

1. Increased traffic is an unavoidable adverse impact of project implementation. The additional traffic would not have a significant adverse effect on Highway 178 or Trona-Wildrose Road, because the capacity of this two-lane paved road is much greater than the traffic that will occur and project-related traffic impacts will be relatively short-term. Canyon would enter into a road maintenance agreement with the County for the maintenance of Ballarat and Wingate roads that would reduce the impact of increased road maintenance to a level that is less than significant.

2. Wear and tear of paved road surfaces would also be an unavoidable adverse affect of project implementation. However, with normal tax and revenue channels to fund routine maintenance, this impact would not be significant.

3. Reduced visibility because of dust generated by routine project traffic would be a significant hazard during shift changes when numerous vehicles travel in succession. Deliveries of large loads would also represent a significant traffic hazard at locations where steep grades and sharp corners occur over the Slate Range crossing.

4. The residual impact to transportation that could occur if borrow material is obtained from one of the offsite sources would be reduced speeds for travelers utilizing the same road as construction traffic. Because of the low level of use of roads that could be affected and the short duration of activities, this impact would not be significant.

4.10.5 MITIGATION MEASURES TO REDUCE RESIDUAL IMPACTS

1. As discussed in Section 4.10.4, the Proposed Action would result in the following traffic hazards that are considered significant:
   - Deliveries of materials and supplies on large trucks would create a hazard at locations on the Slate Range crossing where grades are steep and corners are sharp.
   - Routine project traffic would result in a hazard of reduced visibility due to dust for vehicles traveling in succession on Ballarat and Wingate roads.

   This section discusses additional mitigation measures recommended to reduce these impacts. Because these traffic impacts would be significant, CEQA provides authority for these measures to be imposed by the County. Traffic impacts would not result in unnecessary or undue degradation of federal lands.

2. While the Slate Range crossing is deceptively steep, safe travel for large loads is possible if proper precautions are exercised. The Proposed Action and regulatory requirements for oversize loads include measures for pilot vehicles, safety flagging and other measures, as appropriate based on the load size. Canyon should also inform vendors with large deliveries of the potentially hazardous conditions at the Slate Range crossing. Service contracts or other written statements should warn vendors of the steep grade, sharp corners, reduced speeds required for safe travel, and the need for large trucks to be equipped with a "Jacobs-brake." A map of the site vicinity and clear directions should also be provided in writing to assist drivers in finding the site and to designate areas where large vehicles need to exercise special caution. These areas include the Slate Range crossing and the area near Wildrose where trucks can have difficulty turning around if they pass the Ballarat turnoff. If these additional measures were implemented, project-related traffic would not result in unnecessary or unreasonable safety hazards at the Slate Range crossing or other paved routes in the vicinity. This impact, therefore, would be mitigated to a level that is less than significant.

3. The Proposed Action does not include dust control measures for routine traffic on Ballarat and Wingate roads. Hazards related to dust on Ballarat and Wingate roads should be mitigated by treating and maintaining the access road with an emulsion compound, as recommended in Section 4.6.6. With implementation of this mitigation measure, the hazard of dust due to project-related traffic would be reduced to a level that is less than significant.

4. These additional recommended mitigation measures would be applicable to the Proposed Action or any of the alternatives, except the No Action Alternative.

4.11 NOISE

1. This section addresses potential impacts from noise associated with the construction and operation of the Proposed Action. Effects of noise on wildlife are addressed in Section 4.5. An impact would be considered significant if it substantially increased the ambient noise levels for sensitive receptors in adjoining areas.

4.11.1 PROPOSED ACTION

1. As identified in Section 2.2, the proposed mining operation would use a number of procedures to remove, distribute and process ore. These procedures would generate noise, some of which would be of considerable intensity at the source. Blasting would occur in the mine pit. Ore loading and hauling vehicles would create noise between the mine pit, waste rock piles and crushing area. The crushing and conveying circuit and the electrical generating equipment would also generate noise. These activities would occur during the operational life of the project. As noise is attenuated by distance, atmospheric conditions, and topography, the primary effects of project noise would be limited to the immediate source area.

2. Noise from project activities would be noticeable in the portion of the Manly Peak and Slate Range WSAs that are immediately adjacent to the site. This impact is not expected to be significant because: (1) the area of the WSAs adjacent to the mine site is not recommended for wilderness (BLM, 1990); (2) noise impacts would be short-term; and (3) routine noise would be attenuated to near-background levels within a short distance from the mine site. Part of the rationale for the no-wilderness designation includes the potential for locatable minerals, evidence of mining activity, and current noise sources in the area such as periodic overflight by military aircraft (BLM, 1990).

3. The portion of the Manly Peak WSA that is proposed for wilderness under the DPA begins about one mile east of the project site. When atmospheric conditions are favorable for transmitting noise (i.e., calm air), low levels of project noise may be discernible from proximal locations of the proposed wilderness area. This effect would not be significant because: (1) the level of project noise that would be audible would be low; (2) the impact would be short-term; (3) the level of project noise would be ~~much lower~~ no greater than that related to military overflight; (4) the affected area is a low use area, so the number of potential receptors would be low; and (5) delineation of wilderness would consider mineral

development potential of the Briggs Project site. Most project noise is not expected to be audible from DVNM or lands proposed for Death Valley National Park under the proposed DPA.

4. The farthest-reaching noise impacts of the Briggs Project are expected to be those due to blasting at the mine pit. Blasting events would be short (up to a few seconds) and intermittent, generally occurring once each day. The distance at which blasting noise would be audible would depend upon atmospheric conditions and background noise (e.g., wind) at the time of the blast. Due to attenuation by atmospheric conditions and intervening topography, blasting would not be expected to be generally audible from DVNM or lands proposed for Death Valley National Park under the DPA. It may, however, be discernible, in the area of the proposed park west of the ridgeline, and near the ridgeline constituting the current park boundary in the immediate vicinity of Redlands Canyon when atmospheric conditions are not appropriate for effective attenuation. If audible, the noise would be low level and very short in duration (virtually instantaneous). The effect would be much less than that of current military use of the area. Because of the low noise level, short duration and infrequent occurrence, it would not be significant.

4.11.2 ALTERNATIVES

4.11.2.1 No Action Alternative

1. Under the No Action Alternative, the Proposed Action would not be developed. There would be no increase in noise related to the project.

4.11.2.2 Alternative Ore Beneficiation Rates

1. The slower beneficiation rate alternative may result in a slight decrease in project noise levels, but the difference would not be substantial. The basic project components, including power generation, haul trucks, dozers and other heavy equipment, the ore crushing circuit, blasting, and earthmoving activities would still occur. The degree of impacts due to noise is primarily related to frequency, duration, peak intensity and areal distribution, which would not substantially change as compared to the Proposed Action. The decreased processing rate would, however, prolong noise impacts an additional four years. This would increase the noise impacts as compared to the Proposed Action.

2. Conversely, the faster beneficiation rate alternative may marginally increase noise levels, but effects would occur over a two-year shorter period. This would decrease overall noise impacts as compared to the Proposed Action.

4.11.2.3 Reduced Project Size

1. Noise impacts from the reduced project size alternative would be similar to the Proposed Action, although the smaller project size would shorten the term of noise impacts by approximately two years.

4.11.2.4 Balanced Waste Rock Piles

1. Noise impacts that would occur due to the balanced waste rock piles alternative would not materially change as compared to the Proposed Action. The only difference would be that noise due to construction of the waste rock piles would occur over a slightly different area. There are no known sensitive receptors in proximity to the site that could be close enough for this difference to be notable.

4.11.2.5 Partial Backfilling

1. For the partial backfilling alternative, noise impacts during operations would be the same as for the Proposed Action. However, overall there would be an increase in noise impacts because there would be earthmoving and support activities at the site for about two years longer.

2. The backfilling would require heavy excavation equipment, water trucks to control dust, and haul trucks. Earthmoving activities, power generation, and support activities would result in noise. As discussed in Section 2.3.4, the partial backfilling alternative is based on moving material at approximately the same rate as during operations. Noise levels during the additional two year period would be slightly lower than during operations, however, because the crushing circuit would not be required and blasting would not occur.

4.11.3 MITIGATION MEASURES INCORPORATED BY PROJECT DESIGN

1. The following mitigation measures are incorporated by project design to reduce noise impacts from project activities:
   - Machinery, equipment and vehicles would be equipped with mufflers, as appropriate.
   - Blasting would incorporate good engineering practices to minimize the amount of explosives used consistent with obtaining desired results.
   - Blasting would occur only during daylight hours.

2. These mitigation measures would also be implemented for project alternatives, except the No Action Alternative. For the No Action Alternative, noise impacts would not occur and mitigation would not be required.

4.11.4 RESIDUAL IMPACTS

1. The Proposed Action would not cause any significant noise impacts. Some noise in the vicinity surrounding the site is unavoidable. However, noise would be attenuated by distance , topography and atmosphere and would not be substantial beyond the immediate area of activities.

2. When calm atmospheric conditions occur, there may be low levels of routine noise audible from a small portion of the lands proposed for wilderness under the DPA. Also, blasting that would normally occur for a few seconds once per day, would be audible at low levels from some of the proposed wilderness area and, when atmospheric conditions are calm, possibly from a small portion of the lands proposed for Death Valley National Park.

3. Noise impacts would not be significant due to: (1) low levels of noise that would occur at locations where there may be sensitive receptors (e.g., areas proposed for wilderness); (2) the short duration of the project; and (3) the low number of potentially sensitive receptors in areas where noise would be audible. Because project noise would not result in significant impacts or undue or unnecessary degradation of federal lands, no additional mitigation is recommended.

4.12 SOCIOECONOMICS

1. The potential socioeconomic impacts of the Proposed Action and its alternatives are addressed in this section. An impact would be considered significant if it were to:
   - Substantially change the demand for public facilities or services to the extent that it exceeds current or planned capacity.
   - Result in the need to obtain substantial additional facilities or equipment (such as school classrooms) that are not already planned.
   - Result in the need for an existing system to function beyond its planned capacity (such as a water supply system).
   - Result in the need to expand the capability of an existing infrastructure system (such as a sewage treatment system) that is not otherwise planned.
   - Result in the need for substantial new development (such as for housing).

2. It is expected that most employees would reside in Ridgecrest, with some in Inyokern and Trona. Much of the economic benefit associated with taxes and other mine revenues would occur in Inyo County, where the site is located, while impacts associated with project employees, families, and generated population are expected to occur primarily in the Ridgecrest and Trona areas of Kern and San Bernardino counties, respectively. This impact analysis reflects these assumptions.

4.12.1 PROPOSED ACTION

4.12.1.1 Employment and Income

4.12.1.1.1 Employment

1. The Briggs Project would create jobs for an estimated 155 construction personnel and 130 operations personnel. Some of the construction personnel would be Canyon employees and continue as permanent employees for project operations. Project construction is expected to last for a period of about six to eight months, while site operations are anticipated to last for about six years, with personnel requirements declining during the final period of operations and reclamation.

2. Indirect employment can be estimated, using multipliers for the mining industry, as described in Dobra (1988), which assumes that, for every one job created in the mining industry, an additional 1.25 jobs would be created in other sectors of the economy. Therefore, for project operations, an estimated 160 indirect jobs would be created, assumed to be primarily in Ridgecrest, but also in other areas of Inyo, Kern and San Bernardino counties.

3. For purposes of this analysis, it is assumed that virtually all direct employment (155 mine construction and 130 operations personnel) would occur in the Ridgecrest area, and that about 100 of the indirect jobs also would occur in the Ridgecrest area, with the remainder in other areas of Kern, Inyo, and San Bernardino counties.

4. According to the California Employment Development Department (1993), unemployment in the Ridgecrest area in September 1993 was 7.1 percent, compared to 13.3 percent for all of Kern County (Table 3.12.2). Based on the assumption that the Ridgecrest work force, like the Kern County work force, comprises 47 percent of the population (see Tables 3.12.2 and 3.12.4), then Ridgecrest has a work force of about 13,800 persons. Based on a 7.1 percent unemployment rate, about 966 persons are not employed. The potential addition of an estimated 155 construction jobs and 130 operations jobs, plus indirect employment, would be beneficial.

4.12.1.1.2 Income

1. Personal income would be earned by project construction and operations employees (direct employment) and by persons in jobs that are created as a result of the mine (indirect employment). Much of this income would be spent in the Ridgecrest area, where most employees are expected to live and, as a consequence, where much of the secondary employment would occur.

2. In addition to personal income, purchases of equipment, building materials and supplies, plus leasing and other expenses by the project would contribute to the regional economy of Inyo, Kern, and San Bernardino counties.

4.12.1.2 Population Impacts

1. To the extent practical, project construction and operations employees would be hired from the local labor force. It is expected that most of the construction and operations positions would be filled by existing residents. However, some would move to the area for the project.

2. The population impacts associated with the project would depend on a variety of factors, including, but not limited to, the following:
   - Number of married workers.
   - Number of dependent children.
   - Number of persons/families who are new to the area.
   - Number of persons/families who already live in the area.

3. The number of employees is estimated to be about 155 for project construction and 130 for operations, as noted in the previous section. For personnel who may move to the area for the project, the number of employees who are married with families is expected to be different for construction and operations. Due to the relatively short term of the construction activities, it is expected that few of the construction personnel who move to the area would bring their families. Because few of the construction personnel would bring families to the area, and because many of them would be hired from the local labor force, the total population impact for construction is expected to be less than the number of construction employees (i.e., 155). It is further assumed that 60 percent of operations personnel would have families, with an average of two dependent children. Based on these assumptions, the overall population associated with mine operations is about 364. If it is assumed that 60 percent of the operations work force is hired locally, the population impact due to mine operations would be about 146.

4. Most of the indirect jobs would also be expected to be filled by persons already living in the area. To account for reasonable influx to the area, however, including some persons with families, this analysis assumes the population impact of the indirect jobs to be about the same as the projected number of indirect jobs (i.e., 160).

5. The population that may move to the area as a result of direct and indirect jobs is expected to reside primarily in Ridgecrest and Inyokern in Kern County. Some may also reside in the community of Trona in San Bernardino County~~.~~ , or other small communities in the region.

4.12.1.3 Housing

1. Impacts to housing would differ for the six- to eight-month initial construction stage and subsequent six-year operation of the Briggs mine. Because many of the construction workers would be hired from the local labor force, project construction is expected to result in the need for less than 155 dwelling units. Based on the type and availability of housing in the region,

these housing demands are expected to be met primarily by hotels/motels, mobile homes, apartments, trailers, and RV spaces. Based on the current housing market, these accommodations are expected to be readily available.

2. Based on 60 percent of the operations work force being hired locally, project operations could result in the need for about 52 dwelling units. Additional housing units would also be required to accommodate personnel filling indirect job positions. Housing requirements are expected to be accommodated primarily by mobile homes, apartments, and single family dwellings. Based on the region's housing market, virtually all of this demand is expected to be met by available housing.

4.12.1.4 Schools

1. Based on the estimate of 60 percent of the operating work force being hired locally, the number of dependent children associated with operations employees that may be new to the area is expected to be about 62 . In Ridgecrest, where most project personnel are expected to live, schools are already near or at capacity (Auld, 1993), so accommodating additional students that are dependents of operations personnel and personnel filling indirect job positions could require additional resources. However, due to the relatively low number of potential new students, and recent decrease in population (see Table 3.12.4), impacts are not expected to be substantial. Also, as discussed in Section 3.12.4, expansion of the school system is already planned.

2. New students could be accommodated by the Trona Joint Unified School District, where enrollment is decreasing (Copeland, 1993). Potential impacts are not expected to be substantial.

4.12.1.5 Utilities and Services

1. Impacts to utilities and services depend on the capacity of the system, current demand, and projected increase in demand. The potential impacts to utilities and services in the identified communities that are most likely to experience population growth related to the development of the project are described below.

4.12.1.5.1 Ridgecrest

1. The Ridgecrest water supply system is of sufficient capacity to accommodate increased demand. However, the wastewater treatment and disposal system is near capacity and would be unable to accommodate much additional demand (Turner, 1993). The current processing rate is about 3.2 million gpd compared to the capacity of 3.6 million gpd. Project-related population increases would reduce this available excess capacity and could incrementally add to an eventual need to expand the system. However, in itself, project-related demand would not be expected to cause the small excess capacity to be exceeded and, therefore, would not be significant.

2. Growth-related impacts to the supply and distribution of natural gas, electricity, and telephone services could be accommodated by existing systems.

3. Solid waste disposal facilities and pickup service are adequate to accommodate additional mine-related population (Alvis, 1993), as current estimates include providing for an annual growth rate of about 3.5 percent (Neath, 1993).

4.12.1.5.2 Inyokern

1. Water supply and wastewater disposal systems are adequate to accommodate existing demand. The recent expansion to the water supply system increased its capacity from 315 to 550 connections and is expected to be adequate to 2010. The planned expansion to the wastewater treatment system, expected to be completed by September 1994, would almost double its capacity from the current 70,000 gpd (Ernst, 1993). Therefore, any project-related growth would not significantly affect these systems.

2. Growth-related impacts to the supply and distribution of natural gas, electricity, and telephone services could be accommodated by existing systems.

3. Solid waste disposal impacts would be the same as those discussed for the Ridgecrest area.

4.12.1.5.3 Trona

1. The Trona water supply and distribution system could accommodate limited additional demand resulting from occupancy of existing vacant housing. Further demand would be beyond the

capacity of the existing system. Wastewater treatment and disposal are adequate for existing population and connections to the system, although perhaps not sufficient to accommodate additional connections (Stribling, 1993).

2. At the current rate of 17 tpd, with an estimated 15 years of capacity, solid waste disposal at the Trona-Argus Sanitary Landfill would not be significantly affected by potential impacts of project-related personnel who may live in the area (San Bernardino County, 1993). As discussed in Section 3.12.2, there has been a substantial recent decline of population in Trona.

4.12.1.5.4 Mine Site

1. The Briggs Project would generate about 5 tons (40 loose cubic yards) of municipal solid waste per week. It is expected that this waste would be disposed of at a nearby solid waste facility, pending agreement for out-of-county disposal. Given the relatively small quantity of project-generated municipal solid waste, impact to the receiving facility is not expected to be significant.

2. It is anticipated that agreement could be reached with either San Bernardino County for disposal in the Trona-Argus Landfill, or Kern County for disposal in the Ridgecrest Sanitary Landfill. In either instance, disposal of municipal solid waste from the Briggs Project to either San Bernardino or Kern County would necessitate an agreement between Canyon and the appropriate board of supervisors.

4.12.1.6 Police and Fire Protection

4.12.1.6.1 Ridgecrest

1. The City of Ridgecrest police department has facilities and equipment sufficient for growth up to a population of 50,000. With current population being less than 30,000, the department could accommodate anticipated project-related growth.

2. If project employees were to live in Ridgecrest, the service capabilities of the Ridgecrest Fire Department would not be significantly affected (Clark, 1993).

4.12.1.6.2 Inyokern

1. Law enforcement personnel and facilities are adequate to accommodate anticipated project-related growth.

2. Fire protection personnel and equipment are believed to be adequate to accommodate anticipated project-related growth.

4.12.1.6.3 Trona

1. Police protection is adequate for the existing population. The addition of project-related personnel and families may require additional personnel in the area.

2. Fire protection in Searles Valley is adequate for the existing population. The existing equipment (three engines, three ambulances, etc.) is adequate, but additional population could create a need for additional volunteers, and the Searles Valley Fire Department "always accepts more volunteers" (Aguilar, 1993).

4.12.1.6.4 Mine Site

1. Impacts to Inyo County or other emergency services are not expected. Emergency services provided at the project site would be adequate for incidents which may occur there. ~~The onsite~~ Onsite personnel ~~security force~~ would be ~~armed and~~ appropriately equipped and trained to handle potential incidents. Fire protection measures provided at the site would be adequate for onsite fire suppression. The onsite emergency vehicle would be immediately available for transport to the nearest appropriate medical facility. For these reasons, impacts to other police, fire, or emergency services are not expected.

4.12.1.7 Health Care

1. Health care facilities and personnel that are located in the Ridgecrest area are expected to be adequate to accommodate population growth related to the project. With an average occupancy rate of about 30 percent (Ridgecrest Community Hospital, 1993), the facility would be able to accommodate incoming population associated with the project.

4.12.1.8 Taxes and Revenues

1. Tax revenues would vary from year to year, consisting of federal payroll taxes, sales taxes, and other taxes. The various tax rates are established by statute, and the resulting government revenues are allocated by duly authorized officials. As the site of the project, Inyo County would be the recipient of ad valorem (property) taxes. Once in full production, the mine would be expected to generate property taxes on an annual basis.

2. Sales tax revenues are based on annual mine purchases, and would contribute monies to the area on an annual basis. Sales taxes also would accrue from personal consumption of goods and services by project employees, their families, and associated indirect population. These would accrue to the city/county jurisdiction where the purchases are made.

3. The expected annual economic contributions from the project during its steady-state production period of six years are as follows (Canyon, 1993b):

Economic Activity	Annual Contribution ($)
Payroll	5.3 million
Goods and Services Purchased	15.0 million
State and Federal Income Taxes	1.3 million
Sales Taxes	1.2 million
Property Taxes	0.2 million
TOTAL	23.0 million

4.12.2 ALTERNATIVES

4.12.2.1 No Action Alternative

1. For the No Action Alternative, the project would not be implemented, and there would be no related socioeconomic effects. The employment positions for construction and operation of the project would not occur. There would be no taxes or revenues generated directly or indirectly. The potential need to expand some services, such as Ridgecrest schools and Trona law enforcement, would not occur.

4.12.2.2 Alternative Ore Beneficiation Rates

1. Increasing the rate of ore beneficiation by 50 percent would result in the need to hire a slightly larger work force and, compared to the Proposed Action, would shorten the period of employment offered by the project by about two years. The number of additional employees would be less than proportional to the beneficiation rate (i.e., several additional employees

may be required). This alternative would result in an increase in the demand for goods and services for project operations and for project related personnel. However, this increased level of demand would occur for a shorter period of time than for the Proposed Action. Annual taxes and revenues from mine production and related employment would also increase, but would occur over a shorter period of time. Overall, the shorter project life would result in greater short-term benefit, but less economic stability than would the Proposed Action.

2. Decreasing the rate of ore beneficiation by 50 percent, compared to the Proposed Action, would result in a slightly smaller work force, with an additional four years of employment (i.e., the work force may be reduced by several employees). The reduction in employees would not be as much as the reduction in beneficiation rate. This alternative would reduce the demand for goods and services for project operations and for project-related personnel. However, this reduced level of demand would occur over a longer period of time. Annual taxes and revenues from mine production and related employment also would be less, but would occur over a longer period of time than for the Proposed Action. Overall, the longer operating life would result in more economic stability than the Proposed Action, provided that unforeseen extreme market conditions do not occur that could risk project viability.

4.12.2.3 Reduced Project Size

1. The reduced project size alternative would not substantially change the number of project employees, but the term of employment positions would be shortened by about two years compared to the Proposed Action. Project- and employee-related demands for goods and services would also be lessened, as would taxes and revenues attributable to project activities. For the short-term, the reduced project size and shorter period of activity would result in a less stable economic base. If this alternative were implemented, a portion of the currently economic mineral resource would be left in place for possible future mining.

4.12.2.4 Balanced Waste Rock Piles

1. The balanced waste rock piles alternative would not result in material changes to the number of jobs, amounts of taxes and revenues, or terms of these or other socioeconomic effects of the Proposed Action. The effects of this alternative would be the same as those described for the Proposed Action in Section 4.12.1.

4.12.2.5 Partial Backfilling

1. During operations, the partial backfilling alternative would not change the number of jobs, amounts of taxes and revenues, or other socioeconomic effects of the Proposed Action. For the most part, the effects of this alternative would be virtually the same as those described for the Proposed Action in Section 4.12.1. Partial backfilling would, however, result in several jobs lasting about two years longer. During the two-year duration of backfilling, there would also be demands for goods and services, but the level of these demands would be much lower than during operations.

2. The partial backfilling alternative would result in about two years of economically unproductive activity, with related project expenditures for wages and supplies. These effects would substantially increase mining costs without increasing mineral recovery.

4.12.3 REGULATORY REQUIREMENTS THAT LIMIT PROJECT IMPACTS

1. The project would contribute property taxes to Inyo County on an annual basis. In accordance with the County code, such taxes are assessed to compensate for potential impacts to County facilities and services. However, as described in Section 2.2, the project would provide for its own services and utilities and so would not affect existing County resources. Therefore, project taxes are expected to be assigned wherever they are most needed.

4.12.4 MITIGATION MEASURES INCORPORATED BY PROJECT DESIGN

1. To the extent feasible, Canyon would hire construction and operations personnel from the local labor force. This would minimize population growth and the associated requirements for new public services and utilities. This also would serve to maximize the income that is earned and the taxes that are paid by persons who already live in the area and rely on publicly provided services and utilities.

2. Mitigation measures would be the same as for the Proposed Action for each of the project alternatives except the No Action Alternative. For the No Action Alternative, the project would not be implemented and, therefore, no mitigation would be required.

4.12.5 RESIDUAL IMPACTS

1. Overall, socioeconomic impacts of the project are expected to be beneficial due to the influx of monies to the local economy and due to an incremental diversification of the currently limited economic base. The Proposed Action is not anticipated to have significant adverse effects to socioeconomic conditions based on the capacity of existing services to meet projected demands and considering that the population is in a declining state. Incremental increases in the capacity of some services, such as schools, may be required, but the expected population increase would not require substantial additional facilities or equipment or substantive expansion or upgrading of infrastructure that is not otherwise planned. Existing housing conditions provide vacancy rates adequate to accommodate project construction and operations personnel, so substantive new housing development would not be required.

2. Services that may need to be increased include school capacity in the Ridgecrest area and the law enforcement staff at the sheriff's department in Trona. Additional growth could expedite the need to upgrade and expand the capacity of the wastewater treatment plant in the Ridgecrest area, as the plant is old and operating near capacity. Taxes and revenues that would result from the project are intended to offset these types of impacts.

4.13 ENVIRONMENTAL HEALTH AND SAFETY

1. As with most heavy industrial activities, operation of a gold mining facility requires consideration of a number of environmental health and safety parameters so that operations can occur with minimal threat to the general public, site visitors, and personnel. With the remote location of the project site, related public health and safety issues are primarily those associated with: (1) transport of materials to the site via public roads; and (2) the potential for hazard exposure to occasional recreationists and other persons that may traverse the site area from time to time. Health and safety issues for site employees and visitors are more numerous, and extensive measures are employed throughout mining operations to provide a safe environment for workers and site visitors.

4.13.1 PROPOSED ACTION

4.13.1.1 General Health and Safety

4.13.1.1.1 Public Health and Safety

1. General measures that would occur to protect the health and safety of the public include the following:
   - Fencing around appropriate site facilities, a gate at the project access road, and signs to maintain the public at a safe distance from site activities.
   - Site security to discourage unauthorized access.
   - Regulatory agency permitting reviews in which planned designs and operations are evaluated for compatibility with environmental laws, regulations, and standards.
   - Maintaining safe conditions on the access road to the site, which will be open to public travel.

   These measures are further discussed in the following paragraphs.

2. Access onto the site roads would be controlled by a gate. Signs would also be posted near the project boundary to discourage unauthorized entry onto the mine site. The leach pad, solution pond and reagent storage areas would be fenced. Project security would be provided by trained personnel.

3. Air quality modeling is being evaluated in detail by the APCD as part of their project review process. In order for APCD to grant permits necessary for construction and operation, air quality impacts from site operations must conform with criteria deemed necessary to protect public health, including a margin of safety.

4. Permits are also required to assure adequate protection against leaks or spills of hazardous solutions or reagents. Processing facilities that utilize or contain hazardous constituents must be designed for zero discharge. Design criteria included to mitigate the potential for releases are discussed in Sections 2.2.2 and 4.3.3. These containment provisions protect the public against: (1) direct exposure to hazardous chemicals or solutions that could occur due to potential releases from the site; and (2) indirect exposure that could occur due to potential surface or ground water contamination.

5. Canyon would coordinate with the County regarding a maintenance agreement for Ballarat and Wingate roads. These dirt roads leading to the site would be maintained in accordance with the agreement and County road specifications.

6. Reclamation measures that would be employed would minimize potential hazards remaining after cessation of mining activities. The heap leach pile would be rinsed until an acceptable chemistry is demonstrated. Remaining process solutions would be evaporated and excess reagents, fuels, oils, and other potentially hazardous residue would be removed from the site. Buildings, storage tanks, and other aboveground equipment and utilities would be removed. Site roads, process water ponds, solution transport ditches, and similar surface disturbances would be regraded to conform to surrounding natural contours.

7. Engineering studies (WESTEC, 1993a; 1993b) indicate that overall, the planned post-reclamation slopes would be stable. In the very long term (decades to thousands of years), seismic activity on regional fault systems is inevitable. Ground accelerations at the site due to such seismic activity could cause sloughing of mine pit slopes, and some raveling and sloughing of waste rock pile slopes. The mine pit and waste rock piles would also have an inherent degree of hazard due to their steepness. Reclamation would include regrading and revegetation of site roads, placing rock berms across reclaimed roads to the pit in order to further discourage vehicle access, and regrading of leach pile slopes to an overall angle of 3H:1V. The residual hazard for pedestrian access would not be substantially different than the naturally occurring conditions on the adjacent slopes of the Panamint Range; however, there may be a level of interest in the reclaimed site that would not otherwise occur.

4.13.1.1.2 Employee Health and Safety Procedures

1. In addition to measures protecting the general public, potential hazards to employees would be controlled through extensive training, strict adherence to MSHA and other applicable

regulations, and corporate health and safety policies and programs. Canyon would maintain a health and safety program that, in addition to complying with MSHA requirements, would stress corporate health and safety practice activities aimed at avoiding accidents or injuries and preventing spills or releases.

2. Equipment and facilities would be regularly inspected and maintained to reduce the potential for failure or malfunction. Appropriate safety equipment would be maintained onsite at all times, and employees would be required to utilize specific safety equipment when necessary. Signs would be provided to identify hazardous areas, site traffic patterns, etc.

4.13.1.1.3 Site Visitor Health and Safety

1. Measures discussed above would provide a safe environment for visitors to the site. In addition, visitors that would be onsite for more than five days (e.g., contractor employees) also are required by MSHA regulations to receive training for hazards to which they may be exposed.

2. All visitors would be notified in writing of potential hazards upon arrival to the site. Visitors who are not familiar with the site and operations would be accompanied by Canyon personnel.

4.13.1.1.4 Contingency Procedures

1. A number of precautions would be taken in preparedness of an accident, injury or other emergency. Canyon would maintain a dedicated EMT vehicle equipped to provide first aid and transport in the event of injury. Standard and task-specific first aid training would be provided to employees. First aid supplies, including cyanide antidotes, would be maintained onsite at all times.

4.13.1.2 Storage and Use of Reagents, Fuels, and Oils

1. The storage and use of reagents, fuels and oils could result in some potential for exposure to these materials. Health hazards would mainly be limited to unusual exposure such as accidental ingestion, or chronic exposure inconsistent with proper use. Measures would be implemented to protect against releases, so that the potential for exposure would be minimal.

2. Storage and use of reagents would occur in areas specially constructed to protect against spills and unnecessary exposure. Cyanide solution would be applied using drip irrigation and the processing circuit would be designed as a zero discharge system. Although employees at heap leach mines commonly work in close proximity to the process solutions, there are no known fatalities due to cyanide exposure. This is the result of several factors including:
   - Cyanide in the process solution is of a dilute concentration, and procedures for the delivery, storage, and addition of reagent-grade cyanide are well established and controlled to avoid exposure.
   - While cyanide is lethal in large single (acute) doses, it does not accumulate in the body over time (it has no known chronic toxicity).
   - The pH of the processing solution is maintained above 10.0, so that only very small amounts of HCN are present in vapors.
   - MSHA requires rigid employee training on the handling of reagents and process solutions and includes provisions for monitoring worker exposure levels to certain substances.

3. The water quality standard for cyanide is a relatively low 0.2 ppm and the margin of safety for health risk due to human consumption of water at this concentration is very high. Because of this low criteria, however, regulating agencies impose stringent engineering and construction requirements on facilities used to contain cyanide solutions. These requirements include quality control during construction, and monitoring and frequent reporting during operations as discussed in Section 2.2.2.7. In addition, protection is also provided by reactivity of cyanide, which results in its volatilization into the atmosphere, its natural degradation to nontoxic carbon and nitrogen compounds, and its fixation with the trace metals in soil to form less toxic complexes over time. These processes provide an additional level of redundancy toward reducing the potential of harmful exposure from this processing reagent.

4. Tanks for storage and use of fuels and oils would be installed on prepared foundations or lined areas enclosed with adequate berms to contain the contents of the tanks in the event of a leak or rupture.

5. Employee training would also be key in controlling the potential for exposure to reagents, fuels and oils. Employees would receive task-specific training regarding the proper handling and use of potentially hazardous material. Appropriate personnel would also be trained to handle accidental spills that may occur. A cyanide-destructing treatment compound would be maintained on the site at all times (e.g., sodium hypochlorite, hydrogen peroxide).

4.13.1.3 Transport of Reagents, Fuels, and Oils

1. Site operations would require occasional deliveries of oversized loads (such as heavy equipment), and routine deliveries of hazardous materials (such as reagents and fuels). These types of deliveries have special considerations because of potential health and/or safety hazards presented during transport to the site via public roads. Laws and regulations have been established regarding standards for oversized loads and transporting hazardous materials.

2. Oversized loads are regulated and require a permit from the state and County. These permits designate measures to be taken to protect public safety, including flagging, signs, escorts, etc. Transport of hazardous material is regulated by the Hazardous Material Transportation Act (49 USC 1801 et seq.). Required safety measures include appropriate packaging, labeling, placarding and loading, routing standards, registration, hazardous material training, and routine vehicle safety inspections. Permits to transport hazardous materials would also be required.

3. Canyon would contract only with appropriately licensed suppliers ~~suppliers who operate in accordance with applicable regulations~~, and would encourage transport during daylight hours. In the event of a hazardous material spill, cleaning and decontamination of the affected area would be the responsibility of the hazardous material transportation permit holder.

4.13.1.4 Explosives Handling and Use

1. The primary concern regarding explosives relates to proper handling and use, and the potential for injury. MSHA sets forth regulations to be followed during operations to mitigate these impacts. Explosives would be stored in a secured powder magazine onsite in accordance with MSHA regulations. Canyon would specify that delivery of explosives to the site occur in accordance with applicable regulations and would encourage transport only during daylight hours.

4.13.1.5 Noise

1. Some areas of the Briggs Project site may include activities or equipment that have the potential to create unhealthful noise conditions for persons nearby. Machinery, equipment, and vehicles would be equipped with mufflers, as appropriate, and noise levels would be maintained within MSHA standards. Onsite personnel who are exposed to high noise levels would be required to wear hearing protection devices in high noise level areas.

4.13.1.6 Waste Handling

1. Wastes would be generated from construction, equipment maintenance, routine operations and employee domestic activities. Wastes will be stored, recycled, and/or disposed of in accordance with applicable federal, state, and local regulations. The purpose of these waste storage and handling regulations is to minimize the potential to create a health hazard or conditions that could result in degradation of the environment.

2. Domestic wastes would be stored in containers designed to exclude wildlife and transported offsite for disposal at an appropriately permitted facility. Hazardous waste storage and handling would occur in compliance with applicable federal and state regulations.

3. Domestic wastewater would be disposed of in septic tanks and leach fields. These facilities would be designed, constructed and decommissioned according to the requirements of the DEHS.

4.13.2 ALTERNATIVES

1. Environmental health and safety considerations for each of the alternatives except the No Action Alternative would be the same as those identified above for the Proposed Action. Implementation of the No Action Alternative would mean that the Proposed Action would not be developed and the project site would remain in its present state.

4.13.3 REGULATORY REQUIREMENTS THAT LIMIT PROJECT IMPACTS

1. Environmental health and safety measures for the Briggs Project and related activities would include compliance with an extensive array of federal, state, and local laws and regulations, in addition to site-specific conditions that would be issued in conjunction with permits required for construction and operation. Most of the key regulatory authorities and their related responsibilities in the protection of environmental health and safety are discussed in preceding sections of this chapter. For example, water and air resource protection regulations are discussed in Section 4.3 and 4.6, respectively. Some of the key regulatory measures applicable to environmental health and safety include:
   - Heap leach pad and process pond liners have been designed in accordance with state regulatory requirements to prevent the release of solution to unprotected soils.

- Final rinsing of leached ore would occur prior to the ore pile being decommissioned in accordance with BLM and RWQCB requirements.
- Drainage diversions would be constructed to protect the processing area from run-on. These diversion structures would be designed for the 100-year, 24-hour storm.
- The heap leach and gold recovery process would be a zero-discharge system designed to contain processing solutions in a controlled environment, including precipitation that could fall onto the processing components as a result of the 100-year, 24-hour storm, plus draindown from the ore heap that could occur if power is lost for 24 hours, plus additional freeboard capacity.
- Areas where toxic solutions are used would be designed with dikes or curbs to contain potential spills.
- Waste materials generated onsite would be disposed at approved facilities. Any hazardous wastes that may be produced would be stored in accordance with state and federal regulations and disposed offsite at an appropriately licensed facility.
- Site operations would be conducted in compliance with MSHA regulations.
- Storage and use of explosives would occur in compliance with federal regulations.
- Canyon would encourage compliance with applicable regulations during transportation of materials to the site.

2. Protection of employee and visitor safety would be accomplished through basic operation procedures. The Briggs Project would be under the jurisdiction of MSHA, which enforces standards governing worker and site visitor safety. MSHA conducts routine inspections of mining facilities to assure compliance with these safety regulations.

4.13.4 MITIGATION MEASURES INCORPORATED BY PROJECT DESIGN

1. Mitigation measures incorporated by project design include:
   - Fences would be erected around potentially hazardous areas to deter entry by unauthorized personnel or visitors.
   - A designated EMT vehicle would be provided onsite for emergency response. First aid equipment would be provided at appropriate locations.
   - Implementation of a regular maintenance program for access roads to the site. Speed limits would be posted.

2. These mitigation measures would also be implemented for project alternatives, except the No Action Alternative. For the No Action Alternative, no mitigation would be required.

4.13.5 RESIDUAL IMPACTS

1. No significant unavoidable adverse health and safety impacts are expected to occur. Regulatory requirements and mitigation measures incorporated by project design are expected to be adequate safeguards for environmental health and safety.

2. Air quality impacts due to PM_{10} and other emissions are discussed in Section 4.6. As discussed in that section, PM_{10} impacts are considered significant. However, health and safety aspects of this impact are not considered significant because:
   - Project related PM_{10} concentrations above the health-based federal standard would occur only within a short distance of the project site and, for short periods of time, immediately adjacent to the access road when vehicles pass by.
   - There would be few receptors within the limited areas where the health-based federal standard would be exceeded. Some of these would be present due to participation in inherently dusty activities (e.g., off-road vehicle use), and are not likely to be sensitive to this impact.
   - Exceedance of PM_{10} standards in the desert can often occur under natural conditions.

4.14 EVALUATION OF ALTERNATIVES

1. The CEQA environmentally superior alternative and NEPA preferred alternative are identified in Section 2.3.4.6. The following sections summarize the differences in impacts that would be expected due to implementation of each of the alternatives as compared to the Proposed Action.

2. Table 4.14.1 summarizes differences in environmental impacts for each of the alternatives as compared to the Proposed Action. For each of the alternatives, the table specifies where the differences would be short-term or long-term, and whether the differences would be increased impacts or environmental benefits. Details of these differences are addressed in each environmental resource category discussion in previous sections of this chapter. Short-term differences would be those that would occur during operations and reclamation, and for up to several years thereafter. Long-term differences are those that would occur for decades or more following completion of reclamation.

3. Detailed worksheets were prepared to semiquantitatively evaluate the differences in impacts that are discussed in this section and to determine the environmentally superior and environmentally preferable alternative (Environmental Solutions, Inc., 1994). Pertinent conclusions of these detailed evaluations are discussed herein. The worksheets are part of the public record for this document and are available for review at the offices of the County and BLM.

4. As discussed in Section 2.2.4, offsite mitigation has been volunteered by Canyon in order to make their proposal environmentally superior to project alternatives that are less desirable from an operations viewpoint. Consistent with this intent, Canyon has included the offsite mitigation only in conjunction with the Proposed Action or the balanced waste rock piles alternative. Offsite mitigation has not been volunteered for the remaining alternatives that would not fully implement Canyon's objectives. The absence of offsite mitigation under these remaining alternatives is reflected in the impact analyses throughout this chapter.

4.14.1 NO ACTION ALTERNATIVE

1. As discussed in Section 2.3.4.6, the CEQA environmentally superior alternative is the No Action Alternative. Under this alternative, the Briggs Project would not be implemented. There would be no project-related adverse impacts to the environment. Canyon's existing exploration disturbances would be reclaimed, and the project site would remain open for potential future mining proposals.

2. Although the No Action Alternative is the environmentally superior alternative, its implementation would not be consistent with BLM and County mineral development policies. Land use policies support mining on the project lands, and this alternative would not meet the long-term goals of the BLM and County. Social and economic benefits of the project, including resource recovery, revenues, taxes, and job opportunities, would not be realized.

4.14.2 ALTERNATIVE ORE BENEFICIATION RATES

4.14.2.1 Faster Ore Beneficiation Rate

1. With the faster ore beneficiation rate, the same amount of ore would be recovered and processed, but the operating life of the project would be reduced by about two years. The final project configuration and onsite reclamation measures would be the same as for the Proposed Action.

2. As outlined in Table 4.14.1, the shorter duration of activities at the site would reduce short-term impacts to soils, water resources, vegetation, wildlife, and visual resources, and would reduce the term of noise and traffic impacts and multiple use conflicts due to site operations. However, this alternative is not environmentally superior (or environmentally preferable) to the Proposed Action because there would be a significant increase in short-term air quality impacts of the project, and an overall increase in long-term impacts.

3. Short-term air quality impacts under this alternative would significantly increase due to the approximate 50 percent faster ore handling rate. Air emissions would increase by an estimated 20 to 40 percent. This would result in the federal and state PM_{10} standard, and the state NO_x standard being locally exceeded. The federal PM_{10} standard and state NO_x standard would not be exceeded under the Proposed Action.

4. Long-term impacts to water resources, vegetation, wildlife, land use and visual resources would be increased for this alternative, because benefits from the proposed offsite mitigation would not be realized under this alternative.

4.14.2.2 Slower Ore Beneficiation Rate

1. With the slower ore beneficiation rate, the same amount of ore would be recovered and processed, but the operating life of the project would be prolonged by about four years. The final project configuration and onsite reclamation measures would be the same as for the Proposed Action.

TABLE 4.14.1
COMPARISON OF ENVIRONMENTAL IMPACTS OF PROJECT ALTERNATIVES

IMPACT FROM PROPOSED ACTION	DIFFERENCES IN ENVIRONMENTAL IMPACT AS COMPARED TO THE PROPOSED ACTION					
	No Action	Alternative Ore Beneficiation Rates		Reduced Project Size	Balanced Waste Rock Piles	Partial Backfilling
		Faster	Slower			
TOPOGRAPHY Natural ground contours would be modified. Primary topographic disturbances that would remain following reclamation include the mine pit, leach pad, and waste rock piles.	Proposed topographic modifications would not occur.	No material difference from Proposed Action.	No material difference from Proposed Action.	Topographic modifications of the mine pit, waste rock piles and heap leach pile would be reduced by about 30 percent.(1)	The north waste rock pile would more closely mimic the natural steep topography of the adjacent mountain flank. The south waste-rock pile would increase in size, but the topographic character would not materially change as compared to the Proposed Action.(1)	During project operations, the north waste rock pile would be constructed about 350 feet higher than for the Proposed Action. Following reclamation, approximately 25 percent of the total material removed from the pit would be backfilled, reducing the size of remaining above-ground piles and eliminating the closed depression of the mine pit.(1)
GEOLOGY Potential ground motion and surface rupture from earthquakes could affect stability of project buildings, structures, and slopes.	No potential for geologic hazards to impact project facilities would occur.	No material difference from Proposed Action.	No material difference from Proposed Action.	No material difference from Proposed Action.	No material difference from Proposed Action.	**No material difference in short-term impact.** **Minor long-term adverse impact.** Backfilling would limit opportunities for collection of scientific data from unique geologic exposures expected to occur within the mine pit.
SOILS Potential loss of topsoil due to surface disturbance or erosion, and reduced biological potency of soils due to stockpiling.	No new disturbance to site soils would occur.	**Minor short-term benefit.** There would be a slightly reduced impact to soils due to some growth media being stockpiled for a shorter period of time, thereby reducing potential for effects to biological potency. **No material difference in long-term impact.**	**Minor increase in short-term impact.** There would be a minor increase in impact to soils, due to some growth media being stockpiled for a longer period of time, thereby increasing potential for effects to biological potency. **No material difference in long-term impact.**	**No material difference in short-term impact.** **Moderate long-term benefit.** There would be an approximately 20 percent reduction (by area) in the amount of soil disturbed.	**No material difference in short-term impact.** **Minor long-term benefit.** Slight reduction in soil impacts, due to disturbance occurring in areas of poorer quality soil as compared to the Proposed Action.	**Minor increase in short-term impact.** Impact to soils would be slightly increased due to some growth media being stockpiled for a longer period of time. **Minor increase in long-term impact.** Impact to soils would be slightly increased due to a 13-acre increase in surface disturbances, with an overall decrease in salvageable soils.
WATER RESOURCES The project would consume water from storage in the alluvial basin. Ground water drawdown from pumping could affect wetlands at the playa margin and an intermittent seep at the playa margin near Big Horn Canyon. Changes to surface water flow patterns would occur due to project-related drainage controls and construction of the mine pit. Ponding of water after occasional large storm events would occur in the mine pit. Use of reagents and fuels would result in the potential for impacts to surface/ground water quality.	No ground water withdrawal or potential for water quality impacts would occur. No changes to surface water flow patterns would occur.	**Minor short-term benefit.** A slightly increased water use rate would occur for two years less time resulting in a minor decrease in total water use. **Minor increase in long-term impact.** Onsite impacts would be the same as for the Proposed Action, but offsite mitigation would not occur, so there would be no related benefits to water resources.	**Minor increase in short-term impact.** A slightly decreased water use rate would occur for approximately four years longer, resulting in an increased total water use. **Minor increase in long-term impact.** Onsite impacts would be the same as for the Proposed Action, but offsite mitigation would not occur, so there would be no related benefits to water resources.	**Minor short-term benefit.** A similar water use rate would occur over two years less time, resulting in an approximate 30 percent reduction (about 1,500 acre-feet) in water use. The resulting reduction in ground water drawdown and expedited water table recovery would reduce the potential for drawdown to indirectly affect wetlands near the playa margin, and the intermittent seep that occurs at the toe of the alluvial fan near Bighorn Canyon. **Minor to no net long-term benefit.** The reduced volume of the mine pit would result in natural infilling of the pit by Redlands Canyon restoring free surface drainage about 30 percent faster than under the Proposed Action. However, offsite mitigation would not occur, so there would be no potential for related benefits to water resources. Because offsite mitigation is expected to provide at least minor benefits to water resources, the overall difference as compared to the Proposed Action would be little or no benefit.	No material difference from Proposed Action.	**Minor increase in short-term impact.** Dust control requirements during backfilling would increase project water consumption. Additional drawdown and/or delayed water table recovery due to this additional pumping would increase the potential to indirectly impact wetlands at the playa margin and the intermittent seep that occurs at the toe of the alluvial fan near Bighorn Canyon. **Minor to no net long-term benefit.** Restoration of free surface drainage through the mine pit would occur following reclamation instead of drainage restoration occurring through natural infilling of the pit by sediments from Redlands Canyon, which would occur over the course of a couple of decades to about 100 years under the Proposed Action. Under this alternative, however, offsite mitigation would not occur, so there would be no potential for related benefits to water resources. Because offsite mitigation is expected to provide at least minor benefits to water resources, the overall difference as compared to the Proposed Action would be little or no benefit.
VEGETATION Vegetation would be impacted primarily through the direct removal of plants by surface disturbance related to construction of facilities. Surface disturbance could provide opportunities for establishment of noxious weeds. Ground water withdrawal could indirectly impact vegetation at the playa margin.	Proposed direct vegetation disturbance (up to 470 acres of new disturbance) would not occur. There would be no potential for indirect effects to vegetation at the playa margin due to ground water withdrawal.	**Minor short-term benefit.** Completion of revegetation efforts would occur two years earlier. This benefit is estimated to be slightly greater than the adverse effect of reducing the duration of revegetation test plots by two years. **Moderate increase in long-term impact.** Onsite impacts would be the same as for the Proposed Action, but offsite mitigation would not occur.	**Minor increase in short-term impact.** There would be a four-year delay in reclamation. Although, there may be slightly more opportunity for concurrent reclamation and four years more time for revegetation experiments; these benefits would not fully offset the delayed final reclamation. **Moderate increase in long-term impact.** Onsite impacts would be the same as for the Proposed Action, but offsite mitigation would not occur.	**Minor short-term benefit.** Decreased ground water drawdown would result in a minor decrease in potential to indirectly impact vegetation at the playa margin. **Minor increase in long-term impact.** Considering offsite mitigation that would not occur under this alternative, there would be an increase in vegetation disturbance that would not be reseeded.	**No material difference in short-term impact.** **No net long-term benefit.** About 6 acres of additional waste rock pile slope area would occur under this alternative which would not be reseeded. This minor increased impact would be equally offset by reduced south-facing exposure on the final pile slopes and by offsite mitigation. The reduced south-facing exposure would be expected to result in slightly increased success in revegetation, because south-facing slopes would have the harshest growing conditions. Overall, the anticipated long-term impact would be approximately the same as for the Proposed Action.	**Minor increase in short-term impact.** Increased water use for dust control during backfilling would increase the potential for indirect impacts to vegetation at the playa margin. There would also be a minor increased impact to vegetation due to delay in reseeding of the waste rock pile areas. **No net long-term benefit.** Approximately 71 additional acres of onsite disturbances would be reseeded. However, because there would be no offsite mitigation, there would be an increase in long-term vegetation loss.
WILDLIFE Reduction of wildlife habitat would occur due to project surface disturbance. There would be potential for exposure of wildlife to reagents and processing solutions. There would be indirect impacts from noise, human presence, and project traffic. There also would be potential for ground water withdrawal to indirectly impact wildlife habitat at the playa margin. There would be potential for significant impacts to the Townsend's big-eared bat and to a pair of burrowing owls.	Proposed direct disturbance of habitat (up to 470 acres of new disturbance) would not occur. There would be no indirect effects due to noise, human presence, ground water withdrawal, etc.	**Minor short-term benefit.** Human presence, traffic, noise, and lighting would cease approximately two years earlier. **Moderate increase in long-term impact.** The amount of onsite habitat disturbance would remain the same as for the Proposed Action, but offsite mitigation to restore vegetated habitat would not occur. There would be no material difference in potential for significant wildlife impacts.	**Minor increase in short-term impact.** Impacts to wildlife would increase, due to an additional four-year duration of human presence, noise, and traffic. **Moderate increase in long-term impact.** The amount of onsite habitat disturbance would remain the same as for the Proposed Action, but offsite mitigation to restore vegetated habitat would not occur. There would be no material difference in potential for significant wildlife impacts.	**Moderate short-term benefit.** Decreased ground water drawdown would reduce the potential to indirectly affect vegetation/habitat at the playa margin. Also, the reduced project size would decrease the area and duration of indirect and direct impacts due to human presence, traffic, noise, and lighting. **Minor increase in long-term impact.** Considering offsite mitigation that would not occur under this alternative, there would be an increase in vegetated habitat disturbance that would not be restored. There would be no material difference in potential for significant wildlife impacts.	**No material difference in short-term impact.** **No net long-term benefit.** About 6 acres of additional waste rock pile slope area would occur under this alternative which would not be reseeded to provide revegetated habitat. This minor increased impact would be equally offset by reduced south-facing exposure on the final pile slopes and by offsite mitigation. The reduced south-facing exposure would be expected to result in slightly increased success in habitat restoration, because south-facing slopes would have the harshest growing conditions. Overall, the anticipated long-term impact would be approximately the same as for the Proposed Action. There would be no material difference in potential for significant wildlife impacts.	**Minor increase in short-term impact.** Increased water use for dust control during backfilling would increase the potential for ground water drawdown to indirectly impact wildlife habitat at the playa margin. There would also be an increased impact due to prolonged traffic, noise and human presence due to backfilling activities. **No net long-term benefit.** Approximately 71 additional acres of onsite disturbances would be reseeded for long-term restoration of revegetated habitat. Overall, there would be an increase in long-term habitat disturbance, because there would be no offsite mitigation. There would be no material difference in potential for significant wildlife impacts.

(1) Differences in site topography are accounted for as beneficial or adverse under other resource areas where they affect the level of impact, such as visual contrast or surface water drainage patterns.

TABLE 4.14.1

COMPARISON OF ENVIRONMENTAL IMPACTS OF PROJECT ALTERNATIVES
(Continued)

IMPACT FROM PROPOSED ACTION	DIFFERENCES IN ENVIRONMENTAL IMPACT AS COMPARED TO THE PROPOSED ACTION					
	No Action	Alternative Ore Beneficiation Rates		Reduced Project Size	Balanced Waste Rock Piles	Partial Backfilling
		Faster	Slower			
AIR QUALITY Emissions (primarily PM_{10}, NO_x, SO_2, and CO) to the air would occur as a result of mining activities, ore processing operations, road travel, vehicular exhaust, stationary internal combustion engine exhaust, and the use of leaching reagents. Emissions could result in minor visibility impacts to DVNM and CLNAWS activities. PM_{10} concentrations would locally exceed the state 24-hour standard and, therefore, would be significant.	No project-related emissions would occur. Air quality and visibility would remain unchanged.	**Significant increase in short-term impact.** There would be an estimated 20 to 40 percent increase in emissions rate for two years less time. As for the Proposed Action, the California 24-hour PM_{10} standard would be locally exceeded. Increases in emissions may also cause the federal PM_{10} and state NO_x standards to be exceeded, resulting in additional significant air impacts. The magnitude of visibility impacts at DVNM and CLNAWS would increase incrementally. The reduced term of impacts would not be enough to substantially offset the increased emissions. **No material difference in long-term impact.**	**Significant increase in short-term impact.** Project emissions would locally exceed the California 24-hour PM_{10} standard for about four years longer. Term of impact to regional visibility would also be increased by about four years. These increased impacts would not be substantially offset by the estimated 20 to 40 percent decrease in emission rate. This decrease would not be enough to bring local PM_{10} emissions below the state standard. **No material difference in long-term impact.**	**Moderate short-term benefit.** Air quality and visibility impacts would be similar to the Proposed Action, but duration of impacts would be reduced by two years. There would be no material change in the significant PM_{10} impact except for the duration. **No material difference in long-term impact.**	**Minor short-term benefit.** There would be a slight decrease in the total quantity of emissions during operations, because of a reduction in haul road length. Although the total quantity of emissions would be reduced, concentration at points of public exposure would not materially change. As for the Proposed Action, there would be a significant impact of the California 24-hour PM_{10} standard being locally exceeded. **No material difference in long-term impact.**	**Significant increase in short-term impact.** Air quality impacts would be increased due to material handling required to backfill. During backfilling, PM_{10} and NO_x emissions would be about 85 percent and 60 percent of the operations emissions rates, respectively. Project emissions would locally exceed the California 24-hour PM_{10} standard for about two years longer as compared to the Proposed Action so the increase in impact would be significant. The term of impact to regional visibility would also be increased by about two years. **No material difference in long-term impact.**
LAND USE, RECREATION, AND WILDERNESS Conflict with existing land use in the area.	No project-related land use conflicts for nonmining activities would occur. Because land use policies for the area include mining as a multiple use, the No Action Alternative would not reduce overall land use conflicts and would not be considered superior in meeting the land use goals of the BLM and County.	**Minor short-term benefit.** The shorter period of operation would reduce the term of conflicts with surrounding land uses and allow post-mining uses of the site to occur two years earlier. **Moderate increase in long-term impact.** Long-term impact of the site would be the same as for the Proposed Action, but there would be no offsite mitigation to enhance the multiple use value of these offsite areas.	**Moderate increase in short-term impacts.** The longer operational period would increase term of conflicts with surrounding land uses and delay reinstatement of non-mining uses for an additional four years. **Moderate increase in long-term impact.** Long-term impact due to the site would be the same as for the Proposed Action, but there would be no offsite mitigation to enhance the multiple use value of these offsite areas.	**Minor short-term benefit.** Impacts would be similar during project operations, although over a slightly smaller area. Duration of short-term impacts would be reduced by two years as compared to the Proposed Action. **Significant increase in long-term impact.** Arbitrarily limiting recovery of the mineral resource through implementation of the reduced project size alternative would be in conflict with existing law. Additionally, there would be no offsite mitigation to enhance the multiple use value of these offsite areas. The minimal benefit of reducing the size of the mine pit, waste rock piles and heap leach pile would not substantially offset these increased impacts.	**No material difference in short-term impact.** **Minor long-term benefit.** There would be a slight reduction in long-term land use conflicts because the modified pile configuration would be slightly more amenable to multiple use after mining is completed. The piles would be located over less of the alluvial fan terrain that is readily accessible for recreation and other uses. Visual contrast of the site would also be slightly reduced, resulting in less of an impact on wilderness experience opportunities.	**Minor increase in short-term impact.** The backfilling operation would prolong direct and indirect impacts to multiple uses of the site and surrounding lands by about two years. **Moderate increase in long-term impact.** Backfilling would improve the potential for multiple use of about 78 acres of the site following mining, and would eliminate the potential hazard of the low side of the pit rim. However, these benefits would be offset by the adverse impact of hindering future recovery of gold that would remain in the pit walls and floor. There would also be an adverse impact offsite as compared to the Proposed Action because offsite mitigation would not occur under this alternative. The offsite mitigation that would occur under the Proposed Action would substantially benefit the multiple use value of affected lands through removal of hazards and other land restoration measures.
VISUAL RESOURCES Alteration of the visual character of the site would occur by changing its nature from passive to active, changes to surface colors and textures and vegetative cover, and permanent changes to the site's topography. Night lighting would impact the night character of the area and CLNAWS activities. Visual contrast of some site features would exceed BLM's management criteria and, therefore, would be significant.	No project-related visual impacts would occur.	**Minor short-term benefit.** Return of the site to a passive state and reclamation to reduce visual impacts of site features would occur approximately two years earlier. BLM's visual resource management criteria would be exceeded so project impacts would still be significant. **Minor increase in long-term impact.** Onsite impacts would be the same as for the Proposed Action, but offsite mitigation would not occur.	**Moderate increase in short-term impact.** Return of the site to a passive state and reclamation to reduce visual impacts of site features would be prolonged by about four years. **Minor increase in long-term impact.** Onsite impacts would be the same as for the Proposed Action, but offsite mitigation would not occur.	**Minor short-term benefit.** Return of the site to a passive state and reclamation to reduce visual impacts of site features would occur approximately two years earlier. **Minor long-term benefit.** The mine pit, waste rock piles, and heap leach pile would be reduced in volume by about 30 percent, reducing visual contrast of the reclaimed site. As with the Proposed Action, visual impacts would exceed BLM management criteria and would be considered a significant impact. Offsite mitigation would not occur under this alternative, so there would be no reduction of visual impacts at these offsite areas. This would reduce the net benefit of the decreased visual contrast of the site, but a minor net benefit may still be expected.	**No material difference in short-term impact.** **Minor long-term benefit.** There would be a reduction in visual impact due to the north waste rock pile conforming to a greater extent to the natural topography. The north waste rock pile would also be less visible from upland areas east of the site, including lands proposed for wilderness under the DPA. Visual character of south waste rock pile would not change substantially. As with the Proposed Action, this alternative would exceed BLM criteria, and be considered a significant impact.	**Moderate increase in short-term impact.** During operations, the modified north waste rock pile configuration would increase visual contrast of the site, due to an approximately 300-foot increase in height and 13-acre increase in size. There would also be increased impacts due to restoration of the site to a passive visual character being delayed about two years. During the backfilling period, there would be buildings and structures, equipment night lighting, earthmoving activity, traffic and dust. **Minor increase in long-term impact.** Backfilling would reduce the total pile volume by about 25 percent. However, this would not contribute significantly to reducing the visual contrast of the site because: (1) the majority of the pit highwall would remain, and would become generally more visible (the piles would not block the view as much); (2) there would be surface disturbance scars that would remain visible for decades where waste rock is excavated from the piles to reexpose the mountain flanks; (3) the final configuration of the heap leach pad would not change; and (4) most of the north waste rock piles would remain in place. At the north waste rock pile, the scar from surface disturbance would continue about 450 vertical feet above the final pile top. At the south waste rock pile, the scar would continue about 340 feet above the final pile top. Considering that offsite mitigation would not occur under this alternative, it is expected that the net difference would be a minor increased impact as compared to the Proposed Action.
CULTURAL RESOURCES Project-related activities could disturb or destroy potentially significant sites (CA-INY-4643 and CA-INY-4644) if not mitigated. Increased human presence could facilitate recreational collection of cultural artifacts in project vicinity and elsewhere in the region.	No project-related impacts would occur.	No material difference from Proposed Action.	No material difference from Proposed Action.	No material difference from Proposed Action.	No material difference from Proposed Action.	No material difference from Proposed Action.

TABLE 4.14.1

COMPARISON OF ENVIRONMENTAL IMPACTS OF PROJECT ALTERNATIVES
(Continued)

IMPACT FROM PROPOSED ACTION	DIFFERENCES IN ENVIRONMENTAL IMPACT AS COMPARED TO THE PROPOSED ACTION					
	No Action	Alternative Ore Beneficiation Rates		Reduced Project Size	Balanced Waste Rock Piles	Partial Backfilling
		Faster	Slower			
TRANSPORTATION Increased traffic would occur on roadways in the vicinity of the project site. There would be potential for increased maintenance requirements for roads in the vicinity. Potential traffic hazards would occur on Ballarat and Wingate roads due to truck traffic and dust, and at the Slate Range crossing for large deliveries. Without recommended mitigation measures discussed in Section 4.10.5, some traffic impacts would be considered significant.	No project-related traffic, road maintenance requirements, or potential traffic-related hazards would occur.	**No net short-term benefit.** The decreased duration of project traffic and minor increase in ADT would offset each other, resulting in no material benefit. Except for duration, there would be no change to potentially significant impacts. **No material difference in long-term impact.**	**Minor increase in short-term impact.** There would be a four year longer duration of project traffic. The ADT would only be reduced by an estimated 10 to 15 percent, which would not be enough to offset the increased duration. Except for duration, there would be no change to potentially significant impacts. **No material difference in long-term impact.**	**Minor short-term benefit.** The average daily traffic would be the same as for the Proposed Action, but the duration of traffic impacts would be reduced by about two years. Except for duration, there would be no change to potentially significant impacts. **No material difference in long-term impact.**	No material difference from Proposed Action.	**Minor increase in short-term impact.** Project-related traffic would be prolonged by about two years. Except for duration, there would be no change to potentially significant impacts. **No material difference in long-term impact.**
NOISE Noise levels would increase in the vicinity of the project, due to construction and operations.	No project-related noise would occur.	**Minor short-term benefit.** Similar noise levels would occur, but the duration would be reduced by about two years. **No material difference in long-term impact.**	**Minor increase in short-term impact.** Similar noise levels would occur, but for a period of four years longer than the Proposed Action. **No material difference in long-term impact.**	**Minor short-term benefit.** Similar noise levels would occur, but for two years shorter duration than the Proposed Action. **No material difference in long-term impact.**	No material difference from Proposed Action.	**Minor increase in short-term impact.** Project-related noise would be prolonged by about two years. **No material difference in long-term impact.**
SOCIOECONOMICS Opportunities for employment would be created, and taxes and revenues would be accrued. Construction and project employees would increase the population and place demands on housing availability, schools, and utilities and services.	No project-related jobs, taxes, revenues or demands for goods or services would occur.	**Moderate short-term adverse effect.** Increased annual taxes, revenues and demands for goods and services would be realized but for two years less time than the Proposed Action. The shorter duration of these benefits would substantially reduce economic and employment stability. **No material difference in long-term impact.**	**Minor short-term benefit.** Decreased annual taxes, revenues, goods, and services would be realized, but over an additional four year period. The longer-term of these benefits would result in greater economic and employment stability, provided unforeseen market conditions do not occur that could jeopardize project feasibility. **No material difference in long-term impact.**	**Substantial adverse short-term impact.** The duration of jobs, demands for goods and services, taxes and other socioeconomic benefits would be reduced by about two years. Mining costs would be substantially increased without increasing mineral recovery. **No net long-term benefit.** Approximately 30 percent of the currently economic resource would be left in the ground for possible recovery, under a different proposal, if allowed by future economic conditions and other considerations. However, this cannot be considered beneficial or adverse from a socioeconomic standpoint because the potential for future recovery is unknown. Projections of future technology, economic conditions, and other considerations would be speculative.	No material difference from Proposed Action.	**Minor adverse short-term impact.** Some jobs and demand for goods and services would be prolonged by two years. However, these benefits would not be as great as the adverse impact of substantially increasing mining costs without increasing mineral recovery. **No material difference in long-term impact.**
ENVIRONMENTAL HEALTH AND SAFETY There would be potential for hazard exposure to site employees and visitors. Transportation of material to the site could impact public health and safety. There would be risk of upset of processing system or potential solution/reagent release.	No project-related issues would occur.	No material difference from Proposed Action.	No material difference from Proposed Action.	No material difference from Proposed Action.	No material difference from Proposed Action.	No material difference from Proposed Action.
USE OF NONRENEWABLE RESOURCES(2) Consumption of fuels, oils, rubber, plastic, metal, etc. for mining and support activities.	No project-related consumption of nonrenewable resources would occur.	No material difference from Proposed Action.	No material difference from Proposed Action.	**No material difference in short-term impacts.** **Moderate long-term benefit.** Consumption of nonrenewable resources would be reduced by an estimated 30 percent.	No material difference from Proposed Action.	**No material difference in short-term impact.** **Minor adverse long-term impact.** Use of nonrenewable resources including fuels, oils, plastics, metal, etc., would be increased.

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(2) See discussion in Chapter 6.0.

2. As outlined in Table 4.14.1, the longer duration of activities at the site would increase short - term impacts to soils, water resources, vegetation, wildlife, and visual resources, and would prolong the term of air quality, transportation and noise impacts, and multiple use conflicts due to site operations.

3. Long-term impacts to water resources, vegetation, wildlife, land use and visual resources would be increased for this alternative, because benefits from the proposed offsite mitigation would not be realized under this alternative.

4. The primary benefit of this alternative would be increased economic and employment stability due to the longer project duration. However, this benefit would be minor because the number of employment positions and level of demand for goods and services during operations would be reduced. The minor net socioeconomic benefit would not compensate for the overall increased environmental impacts of this alternative. Therefore, this alternative is not environmentally superior (or environmentally preferable) to the Proposed Action.

4.14.3 REDUCED PROJECT SIZE

1. The reduced project size alternative would reduce the amount of ore and waste rock excavated by 30 percent. Total surface disturbance for the project would be reduced by an estimated 20 percent (about 100 acres). Mining would occur at the same rate as for the Proposed Action, so the project life would be shortened by about two years.

2. The reduced physical size of the project under this alternative and the shorter project life would have minor short-term benefits to water resources, vegetation, and visual resources, and moderate benefits to air quality and wildlife, as outlined in Table 4.14.1. The shorter project life would also result in minor reductions in transportation and noise impacts, and reduced multiple use conflicts due to site operations. There would be a long-term benefit to soils due to the decreased surface disturbance. Long-term visual contrast of the project site would also be moderately reduced due to the smaller size of the mine pit, waste rock piles and heap leach pile. However, these site features would still exceed BLM's visual resource management policy for the area and, therefore, would still be significant.

3. Long-term impacts to vegetation, wildlife and land use would be increased for this alternative, because this alternative would not include the benefits that the proposed offsite mitigation would provide. Offsite reclamation that would occur under the Proposed Action would

also be expected to provide long-term benefits to visual resources by removing buildings, equipment and debris from public lands, and other land restoration measures. The absence of offsite mitigation under this alternative would offset visual benefits of the reduced size of physical disturbances at the site.

4. Conditions do not occur at the site that would warrant imposing a limit on the recovery of the mineral resource. This alternative would not substantially reduce or eliminate any significant impact. Selection of the reduced project size alternative would conflict with federal mining and land management laws, because implementation of the reduced project size alternative is not necessary to avoid unnecessary or undue degradation. As defined in Section 4.7, conflict with these laws would be a significant adverse land use impact. In addition, the reduced project size alternative would substantially reduce socioeconomic benefits of the project. There would be substantially reduced employment benefits, taxes, and demands for goods and services. For these reasons, the reduced project size is not environmentally superior (or environmentally preferable) to the Proposed Action.

4.14.4 BALANCED WASTE ROCK PILES

1. The balanced waste rock piles alternative would modify the waste rock pile configuration so that the north pile more closely mimics the natural landform of the area, as compared to the Proposed Action. The modified configuration would also reduce the average haul distance for the waste rock material. Overall surface disturbance would be the same as for the Proposed Action. This alternative would include offsite mitigation as discussed in Section 2.2.4.

2. The balanced waste rock piles alternative would result in a minor short-term benefit to air quality, as compared to the Proposed Action, due to the shorter average waste rock haul distance decreasing PM_{10} and fuel burning emissions. In addition, there would be minor long-term benefits to soils, land use, and visual resources. There would be no increased adverse impacts.

3. Impacts to soils would be slightly reduced because the same amount of surface disturbance would occur, but the soils disturbed would be of poorer quality than under the Proposed Action. Land use impacts would be slightly reduced because the waste rock piles would be placed over less of the gently sloped alluvial fan terrain, increasing multiple use opportunities of the post-reclamation mine site. Visual contrast of the site would be reduced because the north waste rock pile would better blend with natural landforms, and because it would be

located closer to the mountain flank making it less visible from upland areas to the east. This would make the site less visible from the portion of the Manly Peak WSA proposed for wilderness. The south waste rock pile would be larger, but its visual character would not substantially change.

4. Because it has several benefits and no increased adverse impacts, this alternative is environmentally superior to the Proposed Action. However, it could only be implemented if the WSA status of lands surrounding the project is removed and these lands are returned to multiple use status. This land status change is currently proposed under the pending DPA.

4.14.5 PARTIAL BACKFILLING

1. For the partial backfilling alternative, the mine pit would be excavated to its full configuration during the six-year operating life of the project, and then approximately 25 percent of the excavated material would be backfilled. This would fill the pit to the low side of the pit rim. The backfill area would be graded at the general slope of the alluvial fan surface to approximate natural sediment transport conditions. For this alternative, the north waste rock pile would be reconfigured to reduce backfilling efforts. Backfilling would extend the duration of earthmoving operations at the site by about two years. The rate of earthmoving during backfilling would be about the same as during operations. The partial backfilling alternative would not include offsite mitigation that would occur under the Proposed Action. The absence of this offsite mitigation would offset long-term benefits that would otherwise be realized. As outlined in Table 4.14.1, considering the absence of offsite mitigation, this alternative would increase short- and long-term environmental impacts in most resource areas.

2. Under the partial backfilling alternative, there would be minor increases in short-term impacts to soils, water resources, vegetation and wildlife, and prolonged traffic, noise and multiple use conflicts. There would be a moderate increase in short-term impacts to visual resources because: (1) during operations, the north waste rock pile would be constructed about 300 feet higher and over an area approximately 13 acres larger than under the Proposed Action; and (2) activities at the site and final reclamation to reduce visual contrast would be prolonged about two years. There would be a significant increase in air quality impact because backfilling operations would result in the California 24-hour PM_{10} standard being locally exceeded for a two year longer duration. During backfilling, PM_{10} and NO_x emissions would occur at about

85 percent and 60 percent of the operations rates, respectively. In addition to these environmental aspects, backfilling would substantially increase mining costs without increasing mineral recovery.

3. The partial backfilling alternative would result in little or no net long-term benefit to water resources. Potential for benefit due to restoring free surface water drainage through the mine pit area would be offset by the absence of offsite mitigation. Offsite mitigation that would occur under the Proposed Action would include removal and appropriate disposal of wastes that could degrade water quality, and restoration of surface drainage patterns.

4. Restoring free drainage through the mine pit area by partial backfilling would not provide a significant benefit to water resources because:
   - Surface runoff from Redlands Canyon rarely occurs.
   - The watershed for the playa adjacent to the site is about 1,700 square miles, therefore, disruption of occasional surface water drainage from the six-square mile watershed of Redlands Canyon would not notably affect downgradient hydrologic conditions.
   - The geochemistry of the remaining mine pit wall rock is not prone to producing acidic water conditions or high levels of solubilized metals. On occasions when water would occur in the pit, it would be expected to be of good quality, suitable for wildlife use.

   Also, the Briggs Project site is somewhat unique because the mine pit would naturally be restored to a free-draining condition comparatively quickly, due to sediment transport from Redlands Canyon. Based on WESTEC, Inc. (1993b) estimates of average sediment load discussed in Section 3.3.2.2, the mine pit is expected to naturally fill to a free-draining condition over a term ranging from a couple of decades to about 100 years, without negative aspects of the partial backfilling alternative. Infilling of the pit within this relatively short time period is possible because: (1) the portion of the mine pit that would be a closed topographic depression is relatively small (i.e., about 50 acres); and (2) the mine pit is located at the mouth of a six-square mile watershed, where sediment loads are extreme on the infrequent occasion of substantial surface water flow.

5. As compared to the Proposed Action, the partial backfilling alternative would result in: (1) about 71 additional acres of the site being revegetated following mining; (2) about 78 additional acres of the site being readily accessible for recreational use following mining; and (3) eliminating the potential hazard of the low side of the pit rim. There would also be an adverse impact of hindering future mineral recovery by burying mineralization that would remain in the pit walls and floor. Selection of the partial backfilling alternative, on balance,

falls short of the Proposed Action (with offsite mitigation) in providing benefits to public and management in the Panamint Valley area and vicinity because: (1) under the Proposed Action with offsite mitigation, benefits resulting from reclamation activities would be distributed over a regional area of public lands instead of being concentrated on the mine site; and (2) the partial backfilling alternative without offsite mitigation would result in more long-term surface disturbance on a regional basis than the Proposed Action.

6. The partial backfilling alternative would not contribute significantly to the elimination of long-term visual impacts. Only about 25 percent of the excavated material would be backfilled which, by itself, would contribute a small amount to the reduction of visual impacts because: (1) most of the pit highwall would remain; (2) surface disturbance scars would remain where the waste rock would be excavated from the piles to re-expose the mountain flanks; (3) the final configuration of the heap leach pile would not change; and (4) most of the north waste rock pile would remain in place.

7. Surface scars that would occur on the mountain flank after backfilling would continue about 450 feet above the north waste rock pile. The pile alone would remain about 325 feet high. The south waste rock pile would be about 100 feet high with the scar continuing up the mountain flank about 340 feet above it. Reduction in visual contrast would not be expected to occur for several decades or more, until surface disturbance scars weather and revegetate. When compared to the Proposed Action, long-term visual impact reduction that would occur due to the offsite mitigation plan would outweigh the visual resource benefits of the partial backfilling alternative.

8. The partial backfilling alternative would cause a minor increase in water consumption due to dust control requirements during backfilling. This would delay recovery of the ground water table in the vicinity of the well field and increase the potential to affect the limited wetlands that occur at the playa margin.

9. Backfilling of the mine pit would result in considerable consumption of nonrenewable resources. An estimated 1 million gallons of diesel fuel, plus lesser quantities of gasoline and propane, would be used for earthmoving and support activities (equipment maintenance, power generation, etc.). Oil, plastic, metals, rubber and other materials would also be consumed for equipment maintenance and other activities to support backfilling operations.

10. Considering offsite mitigation that would not occur under this alternative, both short- and long-term impacts of the project would be increased under the partial backfilling alternative. Therefore, this alternative is not environmentally superior or environmentally preferable to the Proposed Action.

CHAPTER 5.0
CUMULATIVE IMPACTS

5.0 CUMULATIVE IMPACTS

5.1 INTRODUCTION

1. Federal regulations consider a A cumulative impact is as the effect on the environment which results from the incremental impact of a proposed action when combined with the effects of other past, present, and reasonably foreseeable future actions (40 CFR 1508.7). The CEQA Guidelines consider cumulative impacts to be two or more individual effects which, when considered together, are considerable or which compound to increase other environmental impacts (14 CCR 15355). The significance of a cumulative impact can be greater than that resulting from individual actions, if the effects of more than one action are additive. This chapter concentrates on analyses of reasonably foreseeable future activities in the area. Also described in this section are existing developments or operations that could have cumulative effects with the Briggs Project that are not substantively represented by assessing impacts of the project on the existing environment, as discussed in Chapters 3.0 and 4.0.

2. Other than projects that are currently planned, projection of reasonably foreseeable development in the vicinity, and the related potential for cumulative effects, requires some speculation. Potential cumulative effects of development that is not currently planned are discussed qualitatively in this chapter due to their speculative nature. It is recognized that future actions would be subject to a process of environmental review by responsible agencies comparable to that for the Briggs Project, and that similar types of mitigation measures and regulatory standards would be required for those future actions.

3. Criteria for evaluating the significance of adverse changes to the environment were identified for each of the 12 resource categories analyzed in Chapter 4.0. These criteria, which are based on resource sensitivity, quality, and quantity, are also applicable to potential cumulative impacts. The timing and duration of each activity is also an important consideration for evaluating the potential cumulative effects of activities. In activities of short duration, a cumulative effect may occur only when two or more activities are occurring simultaneously. The relatively short life of the Briggs Project limits the potential for cumulative impacts that could occur due to possible future actions. Development in the region is limited. For most resource categories, additional developments in the Briggs Project site vicinity would need to occur within a relatively short period of time to result in cumulative impacts. Because of lead time requirements for planning and permitting of major projects, the potential for a substantial number of additional new projects, in addition to those currently planned, is low.

4. The geographical areas considered for cumulative impacts are dependent upon the impact category being evaluated. The study areas have been defined in consultation with both BLM and the County. The following study areas were used to assess the resource categories listed:

   - The western portion of the Panamint Range and Panamint Valley was defined as the area to assess cumulative geology, water, vegetation, wildlife, visual, cultural; and health and safety impacts.
   - The Briggs Project site vicinity (i.e., within several miles) where project noise, including blasting, would be audible, was defined for assessment of cumulative noise impacts.
   - The area encompassing Owens Valley, Searles Valley, Panamint Valley, DVNM, and southerly to include Ridgecrest and Trona in Kern and San Bernardino Counties, was used to provide an overview of potential cumulative impacts for land use, socioeconomic, and public service impacts. The air quality analysis also describes the potential for projects within this larger region to contribute to cumulative impacts.

5. The evaluation of potential cumulative impacts is presented in the following three sections:

   - **Section 5.2** identifies other existing or planned activities in the area and the major environmental effects of each which could be additive to those of the Briggs Project.
   - **Section 5.3** provides an analysis of the potential cumulative effects of these activities when considered collectively with the Briggs Project.
   - **Section 5.4** provides a discussion of a scenario developed by BLM to quantify potential mineral exploration and mining in the project vicinity that is considered by BLM to be reasonably foreseeable.

5.2 DESCRIPTION OF OTHER ACTIVITIES

1. This section provides an overview of existing and future activities which may occur in the area, and cause effects which could be cumulative to those described in Chapter 4.0 for the proposed project. Table 5.1 summarizes important existing activities and projects which are expected to have some potential for being developed within the foreseeable future. The projects on the list have been identified in consultation with the following agencies:

   - BLM
   - County
   - San Bernardino Planning Department
   - APCD

2. Environmental resource categories for which other activities could induce a cumulative impact with the Briggs Project are identified in the table. The known or expected locations of these activities are shown in Figure 5.1. The following sections provide expanded descriptions of existing and future activities in the study area.

TABLE 5.1

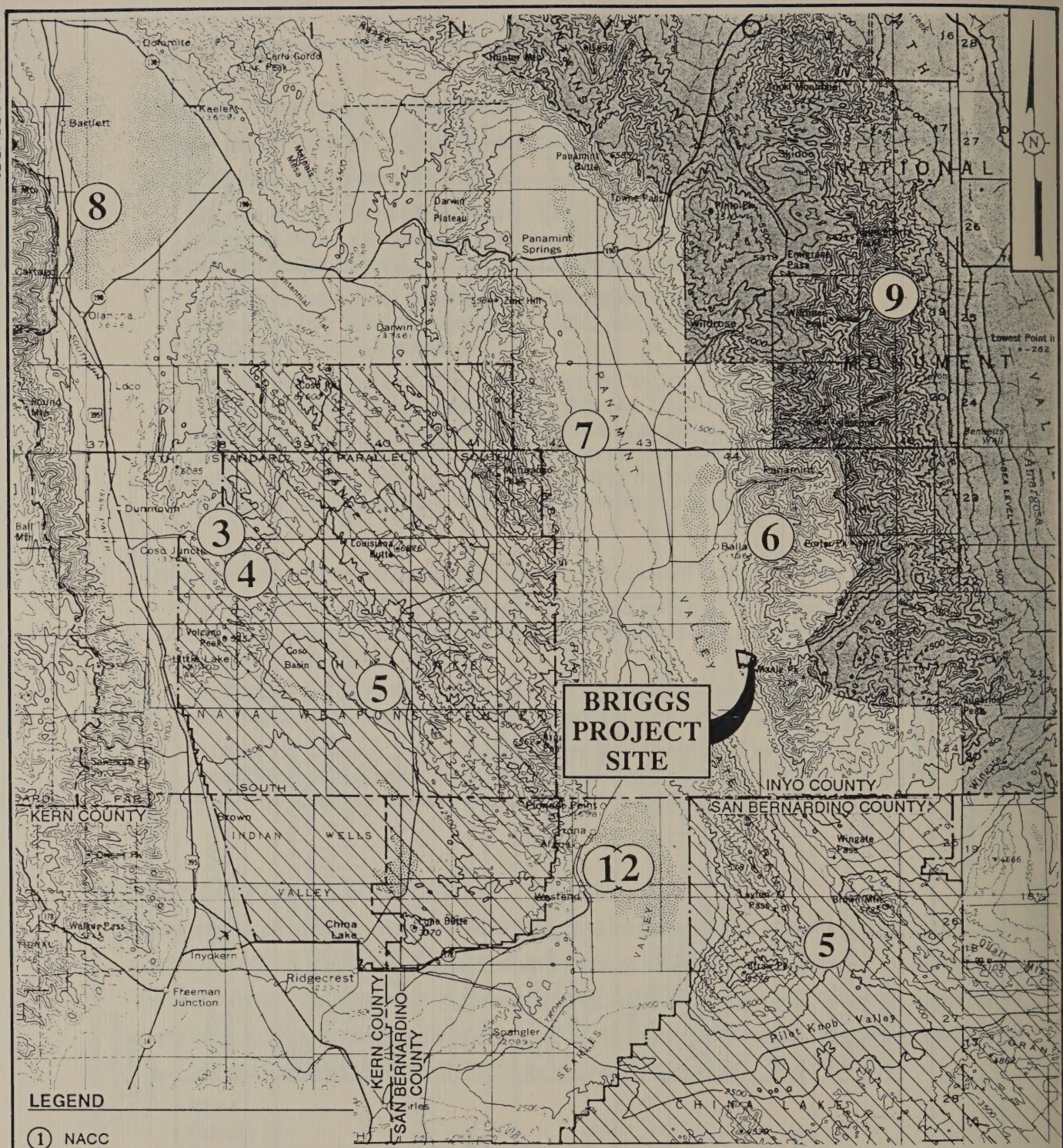
OTHER ACTIVITIES IN THE AREA

NUMBER	ACTIVITY	DESCRIPTION	STATUS	POTENTIAL CUMULATIVE IMPACTS[1]	GENERAL PROJECT LOCATION
		Industrial			
1	NACC	Industrial chemical company which produces approximately 2 million tons (soda ash, boron products, sodium sulfate, etc.) annually from brines extracted from Searles Valley to ship worldwide.	Existing	2, 6, 7, 14	Searles Valley
2	A-C Power Operations Cogeneration Project	96 mw coal-fired power plant which produces steam for NACC processing and supplies electricity to SCE.	Existing (Commissioned November 1990)	2, 6, 7, 14	Searles Valley
3	Coso Geothermal Development	~~Two~~ Four geothermal plants with total rated capacity of ~~160~~ about 250 mw providing electrical energy to SCE public utility grid and subsidizing CLNAWS energy costs.	Existing	2, 6, 7, 14	Coso Range
4	Calpine Geothermal Project	Approximate 150 mw plant to provide energy to the SCE power utility grid.	Proposed	2, 6, 7, 14	Coso Range
		Military			
5	CLNAWS	1.1 million acres in Inyo, Kern and San Bernardino counties including 17,000 square miles restricted air space, 2,000 buildings, and 700 housing units.	Existing	2, 6, 7, 12, 13, 14	Indian Wells Valley and Searles Valley
		Mining			
6	Precious Metals - West Panamint Range[2]	Former mining operations and current exploration projects along western Panamint Range slopes.	Existing/Proposed	1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14	Panamint Range
7	Panamint Valley Limestone Quarry	Reactivation and expansion of limestone quarry and processing facility to support A-C Power in San Bernardino County; 250 acres.	Existing (Approved 1991)	2, 3, 4, 5, 6, 7, 9, 14	Panamint Valley
8	OLSAC	Trona mining and soda ash production facility on west shore of Owens Lake, approximately 12 miles south of Lone Pine. Renovation of 73 miles of rail-to-transport soda ash to Searles Junction in Kern County; 78.9 acres (facility).	Proposed	2, 6, 14	Owens Valley
		Recreational			
9	DVNM	Proposal to expand DVNM and designate it as a national park (included in the proposed DPA 1993).	Existing/Proposed	2, 4, 5, 6, 7, 9, 10, 11, 12, 14	East flank of Panamint Range; north and east to California/Nevada border

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(1) Environmental Impacts: 1 - Earth; 2 - Air; 3 - Water; 4 - Wildlife; 5 - Vegetation; 6 - Transportation; 7 - Public Services/Utilities; 8 - Health/Safety; 9 - Visual Resources; 10 - Recreation; 11 - Cultural Resources; 12 - Land Use; 13 - Noise; 14 - Socioeconomic

(2) Mining Exploration; see Figure 5.2 and Table 5.2 for additional detail.



LEGEND

1. NACC
2. A-C POWER
3. COSO GEOTHERMAL DEVELOPMENT
4. CALPINE GEOTHERMAL PROJECT (PROPOSED)
5. CLNAWS
6. MINING EXPLORATION - WEST PANAMINT RANGE (SEE DETAIL ON FIGURE 5.2)
7. PANAMINT VALLEY LIMESTONE QUARRY
8. OLSAC (PROPOSED)
9. DVNM

REFERENCE: USGS 1:500,000 MAP OF CALIFORNIA, SOUTHERN PORTION; REVISED 1981.

FIGURE 5.1

LOCATION OF OTHER ACTIVITIES IN THE AREA

BRIGGS PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

5.2.1 INDUSTRIAL DEVELOPMENT

1. Two existing industrial developments have been identified for evaluation of potential cumulative impacts. Both of the projects, as described below, are located within San Bernardino County, just south of the Inyo County boundary.

5.2.1.1 North American Chemical Corporation

1. North American Chemical Corporation (NACC) operates a major chemical complex of three plants at Trona located in San Bernardino County, just south of the Inyo/San Bernardino County boundary (see Figure 5.2.) The facility was founded in 1916. Approximately 2 million tons of industrial chemicals are processed annually from brines extracted from the Searles Valley floor. Products shipped worldwide from the facility include: soda ash, boron products (borax and boric acid), and sodium sulfate. Exports consist of 30,000 truck shipments and 10,000 railcar shipments annually. Over 950 persons are employed at the complex.

2. The plant, previously owned and operated by Kerr-McGee, was purchased by NACC in 1990. There are no current plans to expand the operation.

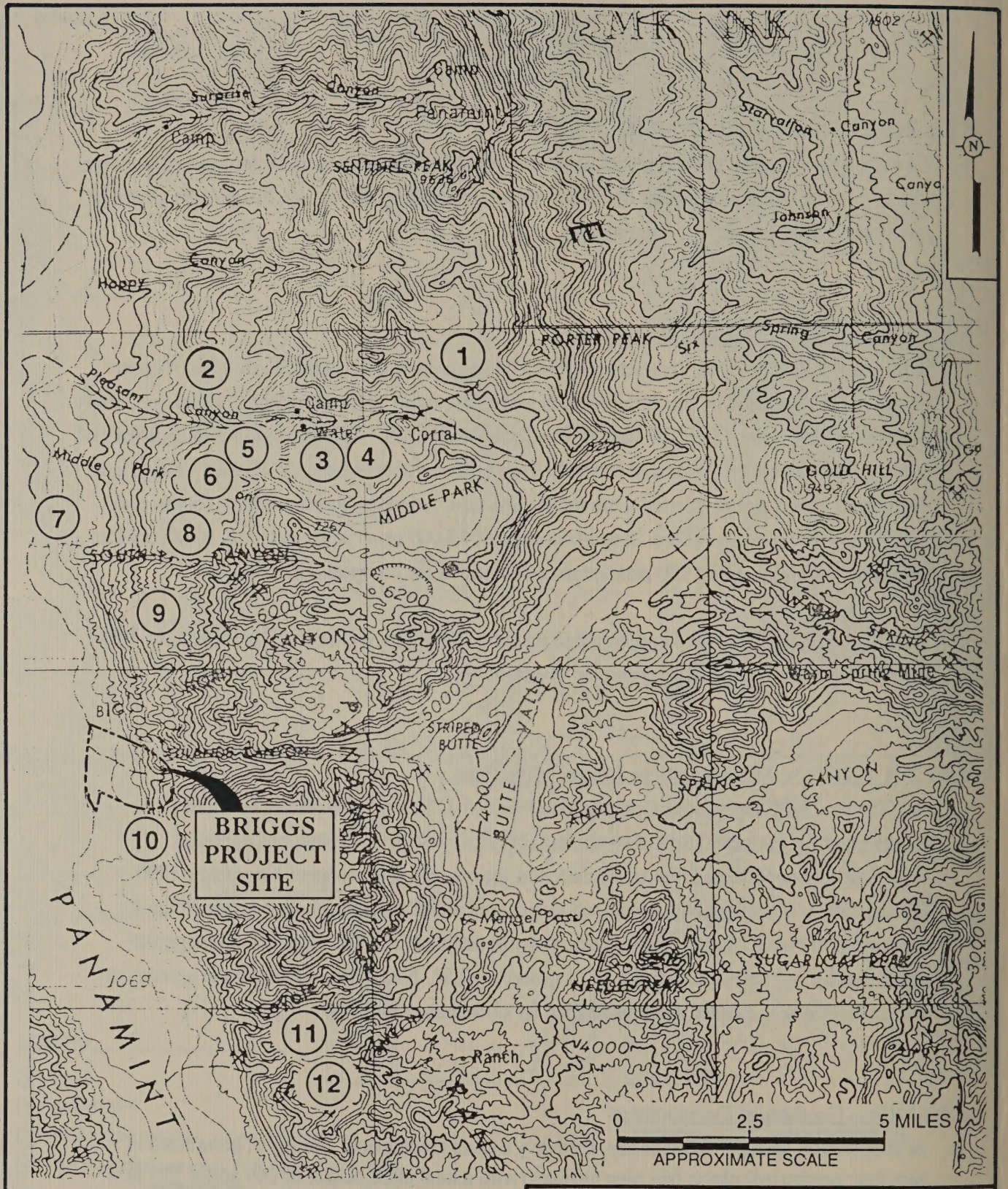
5.2.1.2 A-C Power - ACE Operations Cogeneration Plant

1. A-C Power - ACE Operations Cogeneration Plant (A-C Power) operates a coal-fired power plant for the generation of steam and electrical power. The plant has operated since September 1990 and was commissioned for commercial use as of November 1990 (Zenis, 1993). The plant was developed as a cogeneration project to both provide steam for processing to NACC and to produce electricity to sell to SCE. The plant is a 96 megawatt (mw) facility and sells the majority of its power to SCE. NACC has a contractual agreement with A-C Power to extract steam as needed for chemical processing.

5.2.1.3 Coso Geothermal Development

1. In cooperation with private industry, the Navy's Coso Geothermal Facility is comprised of ~~two~~ four geothermal plants (~~six~~ nine turbines) with a total ~~rated~~ output of ~~160~~ about 250 mw (Monastero, 1995) ~~and a maximum capacity of 192 mw~~. The first unit of the first plant went online in July 1987. The plants are located within the range lands at CLNAWS, as shown in

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LEGEND

(3) ACTIVITY LOCATION
(FOR DESCRIPTION SEE TABLE 5.2)

REFERENCE:
USGS 1:250,000 TOPOGRAPHIC MAPS OF DEATH VALLEY, CALIFORNIA DATED 1970; AND TRONA, CALIFORNIA DATED 1969.

FIGURE 5.2

MINING ACTIVITY

BRIGGS PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

Figure 5.1, within the Coso Mountain Range. The energy is sold to SCE, which also provides a direct electrical energy cost reduction to CLNAWS. The productive life expectancy of the total Coso geothermal field is 1,000 mw for far beyond the life of the current contracts (which are approximately 20 years) (CLNAWS, 1990).

5.2.1.4 Proposed Calpine Geothermal Project

1. As shown in Figure 5.1, the Calpine Geothermal Project would also be located within the Coso Range and provide energy to SCE. An approximate 150 mw plant is anticipated for this project which is in early proposal stages. Due to permitting requirements including the preparation of an EIS/EIR, this plant is not expected to be implemented for at least two years (Hughes, 1994).

5.2.2 MILITARY

5.2.2.1 China Lake Naval Air Weapons Station

1. As described in Section 3.7, the CLNAWS ~~comprises approximately 1,100,000~~ includes over one million acres of land in Inyo, Kern, and San Bernardino counties. ~~The Panamint Valley is within 17,000 square miles of restricted air space, used by CLNAWS for test flights. Within the Panamint Military Operations Area, which includes the Briggs Project vicinity, flights are permitted at speeds exceeding 250 knots at all altitudes 200 feet above ground level or higher (CLNAWS, 1993).~~

2. The physical plant at CLNAWS comprises nearly 2,000 buildings, over 2.5 million square feet of laboratory space, and approximately 700 housing units. As of 1991, more than 5,000 civilians and 1,000 military personnel supported more than 1,500 separate programs at the facility (CLNAWS, 1992). Future downsizing or expansion of the facility is speculative and dependent on national military policy.

5.2.2.2 R-2508 Complex Control Board

1. The R-2508 complex and management organization is discussed in Section 3.7.3.5.

5.2.3 MINING

5.2.3.1 Precious Metals

1. A major block of mining claims is located along the western Panamint Range between Surprise Canyon and Goler Canyon, in the vicinity of the Briggs Project site. The location of active and inactive exploration projects is shown in Figure 5.2. The projects are summarized in Table 5.2. The list of projects in Table 5.2 includes all current and recently active mineral exploration activity in the vicinity that is known to the BLM and the County.

2. The primary minerals of interest are gold and silver. With the exception of the Keystone Mine, the permitted disturbance for each of the projects is less than 10 acres. The Keystone Mine, encompassing approximately 20 acres, is an underground mine which was last operated in 1991. There are no current plans filed to reactivate the operation. Active exploratory operations as of 1993 include drilling at the Porter, Radcliff, World Beater, and Goldbug/Sabre claims.

3. Development of the mining sites is speculative. The level of exploration activity along the west flank of the Panamint Range is an indication that a viable resource may exist. Although it is likely that one or more of these sites may eventually be developed, it is not possible to forecast the extent or the phasing of the future development. Section 5.4 provides a discussion of a scenario developed by BLM to quantify potential mineral exploration and mining in the project vicinity that BLM considers reasonably foreseeable.

5.2.3.2 Other Mining

5.2.3.2.1 Panamint Valley Limestone Quarry

1. Plans to reactivate and expand the existing Panamint Valley Limestone Quarry and processing facility were approved by the County in April 1991. The plant is operated by Intermountain Mine Services for A-C Power. The 250-acre quarry is located at the mouth of Revenue Canyon on the east side of the Argus Range in Panamint Valley, approximately 20 miles north-northwest of the project site (see Figure 5.1.).

2. The limestone is supplied to A-C Power and burned along with the coal to reduce SO_2 emissions. Existing spoil piles at the quarry site are projected to supply enough limestone for the cogeneration plant until 1995 (Thistlethwaite, 1993). When the current supplies are exhausted, plans are to produce between 5,000 to 50,000 tons of limestone per year. Operations are anticipated to last from 15 to 50 years depending on production rates.

TABLE 5.2

WESTERN PANAMINT RANGE
MINERAL EXPLORATION PROJECTS

MAP LOCATION NO.(1)	EXPLORATION PROJECT NAME	PLAN OR NOTICE OF OPERATIONS NO.	LOCATION	MINERAL COMMODITIES	PERMITTED ACRES OF DISTUR-BANCE	MOST RECENT ACTIVITY	CURRENT STATUS (Active/ Inactive)	TYPE OF ACTIVITY (Drilling, Bulk Sampling, Etc.)	CONSTRAINTS
1	Porter	P42798	Pleasant Canyon	Gold, Silver	2	1993	Active	Underground	Adjacent to WSA (137A)
2	Jackpot	P8633	Jackpot Canyon	Gold, Silver	1+	1990	Inactive	Drilling	--
3	Radcliff	P175537	Pleasant Canyon	Gold, Silver	5+	1993	Active	Drilling	Partially within WSA (137A)
4	World Beater	N221713	Pleasant Canyon	Gold, Silver	5+	1993	Active	Drilling	Partially within WSA (137A)
5	Mineral Hill	P1699	Pleasant Canyon	Gold, Silver	1+	1990	Inactive	Drilling	Not accessible by road
6	Goldbug/Sabre	P123169	Middle Canyon (underground mining)	Gold, Silver	2+	1993	Active	Underground Drilling	Adjacent to WSA (137A)
7	Cecil R	P38479	Between Middle Canyon and South Park Canyon	Gold, Silver	3+	1991	Inactive	Drilling	Partially within WSA (137A)
8	Suitcase	P1699	South Park Canyon	Gold, Silver	3+	1990	Inactive	Drilling	Surrounded by WSA (137A)
9	Jackson	P26382	Between South Canyon and Big Horn Canyon	Gold, Silver	2+	1991	Inactive	Drilling	Mineralization within WSA (137)
10	Goldtooth	NA	South of Briggs Project	Gold, Silver	<1	1991	Inactive	Drilling	Within WSA
11	GoldSpur	P58758	Coyote Canyon	Gold, Silver	2	1990	Inactive	Underground	Completely within WSA (137)
12	Keystone	P30774	Goler Wash	Gold, Silver	20	1991	Inactive	Underground	Partially within WSA (142)

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Source: BLM, 1993.

(1) See Figure 5.2 for location of mineral exploration projects.

3. The mining operation consists of a mill site with screen, crusher, and conveyor; office and maintenance building; three existing quarries; a road; and water and power lines. The mining will occur downward into the existing quarries.

5.2.3.2.2 Owens Lake Soda Ash Company

1. Owens Lake Soda Ash Company (OLSAC) proposes to construct a trona and soda ash production facility on the west shore of Owens Lake, located approximately 12 miles south of Lone Pine, adjacent to Highway 395 (County, 1993). The facility would be located in Owens Valley, almost 60 miles northwesterly of the project site.

2. It is projected that at a production rate of 500,000 to 600,000 tons per year, the mineral reserve (16,120 acres in center of the dry Owens Lake) would last for approximately 40 years. Included in the project is the renovation of approximately 73 miles of existing railroad to transport the soda ash from the facility to Searles Junction in Kern County. Eighty percent of the soda ash would be transported by rail (up to 480,000 tons per year) and the remaining 20 percent (up to 120,000 tpd) would be shipped by truck (12 trucks per day).

3. Upon approval of the project, construction of the plant is scheduled for the latter part of 1994, and soda ash production is estimated to begin in 1996. The facility is anticipated to employ 95 people for the operating life of the project.

5.2.4 RECREATION ACTIVITIES

5.2.4.1 Death Valley National Monument

1. DVNM covers 1.96 million acres and is located north and east of the Briggs Project site (see Section 3.7 for additional DVNM description). At its nearest location, the DVNM boundary follows the ridgeline of the Panamint Range, approximately 3.5 miles east of the project site.

2. Under the proposed DPA (as described in Section 3.7.2), the monument would be enlarged (by approximately 1.3 million acres) and would be redesignated as a national park. In the vicinity of the project site, the western boundary of the park is proposed to be moved about one mile west placing it closer to the project. As proposed, the Death Valley National Park would not encompass existing mining exploration properties in the vicinity.

5.2.4.2 Proposed Wilderness Area

1. Under the proposed DPA, 16,105 acres of WSA 137 would be designated as wilderness. The proposed wilderness area would lie between the newly designated Death Valley National Park and the project site. At its closest point, the western boundary of the wilderness area would be located approximately one mile east of the project site. The wilderness area would be protected under the National Wilderness Preservation System.

5.3 EVALUATION OF POTENTIAL CUMULATIVE IMPACTS

1. This section evaluates the cumulative impact on the environment resulting from the Briggs Project, continuing activities at existing facilities, and foreseeable future activities. The Briggs Project site is located in a region where development is limited and generally restricted by environmental constraints, land ownership characteristics, federal land use policies, and County regulations. Most land in the vicinity of the project is managed by BLM as WSA. Multiple uses, as allowed under the Class L designation for the region, include mining, transportation and utilities, outdoor recreation, and wildlife habitat. With the exception of other potential mining projects in the Panamint Range, other activities within the cumulative impact area are generally isolated from each other and from the Briggs Project site either by distance and/or intervening topography. The potential for cumulative impacts on most resource categories, is therefore, minimal.

2. Defining the scope of a cumulative impact discussion for each environmental issue is based on the inherent geographical limits of the issue evaluated. The areas used for the following evaluation were described in Section 5.1. Many of the potential impacts, such as geology, soils, hydrology, and noise, would have localized or site-specific impacts, with little or no impact on an area-wide level. Other impact categories, such as air quality and transportation, are more regional in nature. This relationship is reflected in the "Potential Cumulative Impacts" column in Table 5.1. For example, the OLSAC project, located nearly 60 miles from the project was only evaluated for potential air quality, transportation, and socioeconomic cumulative impacts. In contrast, because of its flight operations in the Panamint Valley, the CLNAWS could contribute to more regional impacts as well as local cumulative impacts such as land use compatibility and noise.

5.3.1 TOPOGRAPHY, GEOLOGY AND SOILS

1. Impacts to topography due to existing and reasonably foreseeable activities are localized in nature and would not have cumulative effects. Similarly, potential impacts of geologic hazards are site-specific so cumulative impacts would not occur.

2. Cumulative impacts to soils would occur, but would not be significant. Existing surface disturbance at the Briggs Project site is minimal and future proposed projects would be required to implement mitigation measures, if necessary, to minimize impacts to soils. Furthermore, the region does not generally have extensive or fertile soils that could represent a significant resource loss considering the low level of development in the area. If suitable soils are present in areas that could be disturbed by possible future development, such soils could be salvaged to mitigate potential resource loss.

5.3.2 WATER RESOURCES

1. Current use of ground water in Panamint Valley is very low (see Section 3.3), much less than the natural rate of ground water recharge. Therefore, overdrafting is not an issue. Wells extracting small quantities of water near Ballarat would be far outside the range of measurable drawdown that could occur due to the Briggs Project. The Panamint Valley Limestone Quarry obtains water from a spring in Revenue Canyon and does not use ground water. The Briggs Project would not impact any spring flow, so there would be no cumulative impact to area springs.

2. The primary potential for cumulative impacts to water would be the possibility of future mine development to require that an additional water supply well field be developed in Panamint Valley. The large water basin of the Panamint Valley would be capable of supplying additional large production well fields. Substantive cumulative effects could only occur if a future well field was to be located near the Briggs Project site such that the radius of influence of drawdown overlapped with that of the Briggs Project. If this condition were to occur, drawdown impacts at any given location would be additive.

3. Environmental reviews would be required for any proposed project that could have substantial effects. Such reviews would require modeling of potential impacts considering the presence of the cone of ground water depression attributable to the Briggs Project. Depending upon

the potential future well field location, the future project may individually or cumulatively be capable of causing drawdown near the edge of the playa that could affect wetlands or intermittent surface water seeps known to occur within several miles of the project.

4. The likelihood of an additive impact occurring is limited due to the speculative nature of possible additional mining operations occurring nearby and due to the relatively short life of the Briggs Project. Because of this and mitigation measures that would be required for potential-future projects if additive effects were to occur, significant cumulative effects to water resources are not expected.

5.3.3 VEGETATION

1. Under current permits, a total of approximately 47 acres (excluding the Briggs Project site) could be disturbed for mining exploration projects (see Table 5.2 and Figure 5.2). Future development of any of these mine sites could result in additional vegetation disturbances comparable to the Briggs Project. As with the Briggs Project, reclamation of the sites would be required including revegetation of the majority of disturbed areas.

2. Without site-specific biological surveys on the other claim areas, precise information on plant species cannot be known. The alluvial fan and lower mountain areas in the region are dominated by vegetation similar to the Mojave creosote bush plant community of the project site. Some occurrence of riparian vegetation and jurisdictional wetlands could also be anticipated adjacent to the playa area and isolated springs. At higher elevations of the mountains, vegetation transitions to pinion-juniper woodlands as discussed in Section 3.4.1.2. Because the Briggs Project would not affect any federal or state listed, proposed or candidate rare, threatened or endangered plant species, there would be no cumulative effects on these plant species.

3. Vegetation disturbance at the Panamint Valley Limestone Quarry will be very limited because the mining operations will consist of deepening of existing quarries in areas which have already been disturbed. The potential expansion and redesignation of DVNM as a national park would be expected to result in additional protection for vegetative resources in the area.

4. Due to the abundance of the Mojave creosote bush plant community in the region, limited known ~~sensitive~~ special interest species in the area, low likelihood of substantial acreages being developed concurrently, and the lack of impacts to rare, threatened or endangered species in the Briggs Project vicinity, cumulative vegetation impacts would not be anticipated

to be significant. Even if a number of mines were to be developed simultaneously, phased reclamation would be expected to mitigate the long-term vegetation impacts of these projects to a level that is less than significant.

5.3.4 WILDLIFE

1. The potential for cumulative wildlife impacts was evaluated for the Briggs Project in conjunction with other activities within the Panamint Valley, Panamint Range and DVNM. The western portion of the Panamint Range, as identified in the WSA inventories in the Briggs Project area (WSAs 137, 137A, 142), provides a variety of wildlife habitat. In particular, the Manly Peak WSA (137), includes numerous canyons and water supplies which support diverse riparian vegetation.

2. Development of one or more new mines (in addition to the Briggs Project) within the western Panamint Range would disturb additional wildlife habitat. The western portion of the Panamint Range provides desert bighorn sheep habitat. The bighorn sheep is a ~~fully~~ state~~-~~protected species ~~by the state~~. As discussed in Section 3.5.2.6.3, NPS has identified six springs that are considered to be most important to the bighorn sheep within the area of the Panamint Range between Surprise and Goler canyons. Sheep habitat near most of these springs has been impacted by the presence of nearby roads, recreation, and mineral exploration or development activities. Bighorn sheep studies conducted specifically for the Briggs Project, as discussed in Section 3.5, indicate that steep slope areas above 3,000 feet in elevation and within two miles of Redlands Spring are important to the bighorn sheep (Weaver, 1992). The Proposed Action includes avoiding disturbance to Redlands Spring and avoiding use of water from this spring. These aspects of the Proposed Action are important to avoid the potential for significant cumulative impacts to this species.

3. Future mine development in the Panamint Range could cause further negative impacts to bighorn sheep, particularly if it occurred at elevations above 3,000 feet or if it impacted fresh water sources. Several of the exploration projects in Table 5.2 are at elevations above 3,000 feet. It is expected that any mine proposed would be required to implement mitigation measures to avoid significant project-specific or cumulative impacts to this species. With the relatively large area of habitat available in the vicinity, the potential for a significant cumulative impact would primarily be related to the possibility of a future development affecting an important water source (i.e., one or more springs). If water sources could not be avoided by a future proposed development, alternative water sources could be provided to

minimize impact to the sheep. The bighorn sheep impact monitoring program discussed in Section 2.2.2.7.4 would provide substantial information that would be useful for evaluating cumulative impacts of future projects.

4. The potential for cumulative mining development to result in adverse impacts to the Mojave ground squirrel (state-threatened species) or the desert tortoise (state and federal listed threatened species) cannot be determined without further, site-specific biological inventories of potential future projects. ~~Neither species, however, has been recorded as being observed in the western Panamint Range~~.

5. Mine development could also impact the habitat ~~for the~~ of *Plecotus* (Townsend's big-eared bat, state species of concern and FWS Category 2 candidate species), ~~Within desert areas, this bat is now found almost entirely in mine adits. Reactivation of a number of mining areas could limit available roosts.~~ as all but one of the known roosts of the Townsend's big-eared bats in the California desert (and all known roosts in the Panamint Range) are in mines. All future projects will be evaluated for cumulative impacts.

6. Increased mining development would result in cumulative impacts ~~of~~ due to human presence, noise, and loss of wildlife habitat, which could adversely impact numerous species. There are, however, several conditions which will limit the degree to which these impacts are likely to occur:
   - Mine development within the area is speculative and would likely be phased over a long period of time. Concurrent operation of a substantial number of mines is unlikely.
   - The proposed designation of 16,105 acres of WSA 137 (Manly Peak) under the DPA would provide maximum wildlife protection within that area.
   - The proposed westerly extension of DVNM, and designation of the monument as a national park (under the DPA) would further limit development and enhance wildlife protection.

7. Reactivation of the Panamint Valley Limestone Quarry would not significantly contribute to cumulative wildlife impacts. The operation will result in additional surface disturbance of only 2 acres of habitat. Moreover, no ~~sensitive,~~ threatened or endangered species are known to occur within the area of this project, which is located across the valley from the Briggs Project.

8. Overall, cumulative impacts to wildlife resources would not be significant. As with the Briggs Project, future mining development in the west Panamint Range would be subject to thorough

environmental review. Mitigation measures would be required to minimize wildlife impacts. As described, additional resource protection is also likely to be implemented under the DPA.

5.3.5 AIR QUALITY AND VISIBILITY

1. Emissions from the Briggs Project facilities would not substantially combine with emissions from other existing or currently planned facilities in the region which affect air quality. The other facilities in the region which affect air quality are spaced far apart. Most of the larger potential emission sources are separated from the Briggs Project site by mountains rising 2,500 to 3,000 feet above the floor of the Panamint Valley. Air masses rarely ascend such distances, and when they do, the motion is very turbulent and the air is thoroughly mixed. The NACC, A-C Power, CLNAWS, the existing and proposed geothermal plants, and DVNM are all outside the Panamint Valley, as shown in Figure 5.1. The OLSAC facility at Owens Lake is also beyond the mountain ranges and is nearly 60 miles from the Briggs Project site. Therefore, facilities and activities at these locations would not affect or be affected by the air quality in the immediate vicinity of the Briggs Project.

2. For a combined affect to occur, the emissions from the respective facilities must meet and combine. The maximum potential for emissions to combine would occur when the wind is blowing directly from one facility toward the other. Given that the Briggs Project site is separated from the nearest substantial sized facility within the Panamint Valley (the Panamint Valley Limestone Quarry) by approximately 20 miles, it is extremely unlikely that the plume from either facility would persist long enough to combine with that of the other. The Briggs Project, Panamint Valley Limestone Quarry, and other mineral exploration activities do not emit quantities of NO_x or VOCs that would be sufficient to cumulatively create significant O_3.

3. Emissions from existing exploration activities are minor and source locations are temporary, so cumulative effects would not be significant. Potential combined effects could occur due to particulate emissions, and possibly other emissions, if another mine were to be proposed in the project site vicinity. However, given the required time to permit and construct a mine, and the relatively short duration of the Briggs Project, the likelihood is relatively low that there would be substantial combined or cumulative effects from future mines and the Briggs Project. Also, as with the Briggs Project, the environmental review procedure for future mine development would require a full assessment of potential air quality impacts.

4. The cumulative impact on air quality due to the Briggs Project would be an incremental degradation of regional air quality. That is, the minor increases in the concentrations of emitted constituents in the immediate vicinity of the Briggs Project site would cause an incremental increase in the regional average concentrations of these constituents. The incremental increase in regional average concentrations would not change the air quality status with respect to any ambient air quality standards, so there would be no significant cumulative effect.

5. Impacts to visibility occur due to particulates, NO_x and SO_2. Cumulative visibility impacts would be directly related to the cumulative air quality impacts discussed above. As for cumulative air quality impacts, there could be incremental impacts to visibility. However, the cumulative effects of emissions to the air would not significantly impair regional visibility conditions.

6. National parks and wilderness areas over 6,000 acres in size are designated as Class I areas under the Clean Air Act PSD Program. Class I areas are subject to the most strict guidelines for allowable emissions. There are currently no Class I areas in the project vicinity. Designation of wilderness areas and Death Valley National Park under the DPA, therefore, would increase the level of air quality protection by creating Class I areas in the vicinity. In the event that any large sources of emissions were to be proposed in the future that would be subject to PSD review, consideration of proximity to Class I areas would be an integral part of the New Source Review Process. Emissions from the Briggs Project would not affect, or be affected by, the Class I designation because the emissions are too small to trigger PSD requirements.

5.3.6 LAND USE, RECREATION AND WILDERNESS

1. The Panamint Valley Limestone Quarry and possible future western Panamint Range mining development are consistent with existing area plans, policies and regulations. The proposed DPA also recognizes the mineral resource in the area. Boundaries for both the proposed Death Valley National Park and wilderness areas in the vicinity have been drawn to avoid known or potential mineral conflicts.

2. Several competing land uses in the area could increase land use compatibility impacts. Important issues include the potential cumulative impacts of the Briggs Project, in combination with future projects, on wilderness and recreation opportunities in the western Panamint Range. These potential impacts may be considered greater if, under passage of the DPA, DVNM is designated a National Park, and 16,105 acres in proximity to the Briggs Project site

are classified as wilderness. Cumulative impacts to wilderness would be comprised of a combination of increased noise, fugitive dust, night lighting, modification of the existing terrain with related visual impacts, and constrained local recreation access to off-road vehicles, hiking, mountain biking, and other recreational uses. For the proposed project, these impacts to WSAs, proposed wilderness areas and Death Valley National Park are summarized in Tables 4.7.1 and 4.7.2. Similar impacts would also be likely to occur with increased mining activity.

3. As discussed in Section 4.7, CLNAWS flights create visual and noise disruptions, and existing and former exploratory mining have resulted in mining scars and operational impacts which distract from the wilderness experience. Additional developments within the Panamints would further degrade wilderness opportunities.

4. Site-specific development measures and regulatory requirements for future projects would help alleviate cumulative land use impacts. Reclamation of mining operations (as required by BLM and SMARA regulations) would mitigate long-term impacts to the potential wilderness area proposed under the DPA. Impacts to recreational opportunities would primarily be short-term. Future operation levels of CLNAWS can only be speculated.

5. With anticipated site-specific mitigation measures, implementation of regulatory requirements, and the unlikelihood of simultaneous, large-scale mining operations, cumulative impacts to land use are not expected to be significant.

5.3.7 VISUAL RESOURCES

1. The potential for an increase in the numbers of visitors to DVNM (if expanded and elevated to national park status) could result in the Panamint Valley area being utilized as a transportation corridor and for recreation on a more frequent basis, providing more opportunity for viewing the area which would increase the degree of visual impact of the Briggs Project and other area projects. However, even if non project-related traffic in the area was to increase by 100 percent (i.e., to about 430 one-way trips per day), this would still represent a relatively low use rate.

2. The existing Panamint Valley Limestone Quarry is distant enough from the Briggs Project site so that its cumulative effect is minor. If any large scale mining operations are developed within the same view shed as the Proposed Action, additional cumulative impacts could occur.

Considering time involved to prove resource viability, and plan and permit a substantial project, it is unlikely that short-term visual impacts (i.e., light, dust) would be concurrent for any extended period. For this reason, short-term cumulative impacts of additional mineral development, if any, are not expected to be significant. The primary potential for cumulative impacts to visual resources are those impacts that may be long-term resulting from topographic changes and surface disturbances. Such long-term cumulative impacts could be significant for views from the valley area or adjacent ranges (e.g., the Argus Range) if one or more large open pit mining projects were developed in clear view of the highway or other locations from where the Briggs Project site would be visible.

3. As discussed in Section 4.8, the Briggs Project site would not be visible from proximal portions of lands currently proposed for national park under the DPA. However, portions of the Briggs Project facilities would be visible from some locations proposed for national park in the north end of Panamint Valley, and some locations within lands proposed for wilderness. The Panamint Valley Limestone Quarry and portions of the Briggs Project site would be visible from some common areas proposed for park and wilderness. The cumulative visual impacts of these two projects would not be significant because these locations occur where the view of the Briggs Project would be distant enough that these features would not attract attention.

4. Additional mine development in the area could result in similar impacts on views from other locations. Because of intervening topography and the location of other known sites with potential for mineral development, is unlikely that proximal views of the Briggs Project would be possible from the same locations within proposed wilderness areas as proximal views of potential future developments. However, development of one or more of the exploration projects in Figure 5.2 could result in cumulative effects to distal views from the north and western portion of the valley, including areas proposed for national park and the proposed north Argus wilderness. The degree of this effect would depend greatly on the location, size and layout of future development. Assessment of visual impacts would occur as part of the environmental review process.

5. Night lighting may also adversely impact CLNAWS flight operations. The Panamint Valley is used by CLNAWS for Night Vision Goggle system testing and training (CLNAWS, 1993). It is expected that any new mine developments would be required to use shielded lighting and other practical measures to minimize offsite lighting impacts. With these measures and the probable distances that would occur between potential economic ore bodies, impacts to military use of the area is not expected to be significant.

5.3.8 CULTURAL RESOURCES

1. Cumulative effects to cultural resources can result from land-altering activities in archaeological deposits or from recreational collection of artifacts from surface and subsurface cultural sites. Existing state and federal legislation and regulations require the inventory and evaluation of cultural resources, and the treatment of significant properties that may be affected by a proposed project. These regulatory requirements serve to offset the potential for cumulative effects because either significant sites are preserved, or the significant data contained by the sites are preserved through research, reporting and curation.

5.3.9 TRANSPORTATION

1. As discussed in Section 4.10, development of the Briggs Project would generate about 65 round trips per day. Additional mining development within the western Panamint Range could add additional traffic. The Panamint Valley Limestone Quarry will generate both employee and product transport traffic along Trona-Wildrose Road. Additional tourist growth to DVNM in conjunction with the proposed expansion, could also generate additional trips on Trona-Wildrose Road. This road provides access to the DVNM through Panamint Valley to where it connects with State Route 190, a primary access to DVNM.

2. CLNAWS employees primarily reside in Ridgecrest and travel local roads. Expansion or down-sizing of the CLNAWS operations would not be anticipated to significantly impact the roads which would be impacted by the Briggs Project. Similarly, both the existing and proposed geothermal projects (Coso and Calpine projects, respectively) would not be anticipated to impact roads used by the Briggs Project. Primary access to these project sites is from Highway 395.

3. OLSAC is anticipated to generate approximately 20 truck trips per day (combined product transport and facility supply deliveries). These trips would be added to existing traffic on Highway 395. The railroad renovation associated with OLSAC would reinstate five crossings of Highway 395 and one crossing of Highway 178. An EIR is being prepared which will be required to assess the traffic impacts and propose transportation mitigation for this project.

4. The existing NACC and A-C Power facilities, located in Trona, also contribute traffic to Trona-Wildrose Road. Since there are no immediate plans to expand these facilities, existing traffic conditions reflect the impacts of these project on the local road network. As described in Section 4.10, currently traffic loads are low.

5. Cumulative traffic impacts are not anticipated to be significant. Sufficient road capacity exists for the projects currently identified within the Panamint Valley. Transportation improvements that may be required in conjunction with any major developments (including OLSAC) which would mitigate transportation impacts to a level that is less than significant.

5.3.10 NOISE

1. The potential combined noise impacts of CLNAWS's low-level test flights and future-potential mining projects conflict with the wilderness objectives of DVNM and the proposed wilderness area portion of WSA 137 (east of the Briggs Project site). Depending on the level of mining activity that could occur in the near future, cumulative noise could also be expected to adversely impact area wildlife. Noise effects of the Briggs Project would not be cumulative with other mining projects unless they were to occur in the immediate vicinity (i.e., within the audible range of Briggs Project activities).

2. As stated previously, the proposed DPA acknowledges the mineral resource in the vicinity and has drawn both the proposed wilderness area and Death Valley National Park boundaries to avoid these areas. The proposed DPA also acknowledges the importance of military testing and does not propose restricting low-level flights in the Briggs Project vicinity.

3. Due to the speculative nature of future mining development and the regulatory environment to protect sensitive resources, cumulative noise impacts are not expected to be significant.

5.3.11 SOCIOECONOMICS

1. All of the related projects identified in this chapter could potentially contribute to employment growth and associated population growth in the surrounding communities. Within the identified cumulative impact area, the primary contributors for potential new employment would be CLNAWS, the mining industry and tourism.

2. Existing conditions reflect socioeconomic impacts of NACC, A-C Power, CLNAWS and the Coso Geothermal Development. Future mining projects the proposed OLSAC Project (estimated 95 employees), and the proposed Calpine Geothermal Project could provide additional permanent employment for operations personnel, plus temporary employment for construction personnel. There would also be "indirect" or secondary employment in jobs that

are created by the demands of persons associated with the major employers. Future increases in tourism related to the expansion and proposed designation of DVNM as a national park, would also be anticipated to create additional employment opportunities.

3. New project development in the area would create at least incremental increases in the demand for all services. These impacts would primarily affect Ridgecrest and Trona. An influx of families to Trona could tax the community's potable water resources, while an influx of population to Ridgecrest could result in the need for additional school ~~systems~~ facilities and sewer treatment capacities (see Section 4.12).

4. Cumulative socioeconomic impacts of the proposed activities in the region would be expected to be beneficial. Incremental increases in demands for infrastructure and services would be mitigated by the taxes and revenues incurred by the new activities.

5.3.12 ENVIRONMENTAL HEALTH AND SAFETY

1. These issue of health and safety is not a cumulative impact issue since the potential effects of the Briggs Project would be primarily restricted to operations onsite and would not have the potential to be cumulative with activities at other sites. Health and safety procedures are also regulated by local, state and federal laws.

5.4 POTENTIAL FUTURE GOLD MINING AND EXPLORATION SCENARIO

1. Except for the Proposed Action, there are no known plans for substantive development of gold mining or exploration in the southern Panamint Range or Panamint Valley area. No proposals, or consideration of such proposals, have been announced. However, to further the cumulative impacts analysis provided in Section 5.3, BLM has developed the gold mining and exploration scenario for the project vicinity that is discussed in is section. BLM has assumed an approximate three year time frame for the definition of "reasonably foreseeable future." In this timeframe, BLM expects a high level of gold exploration activity to take place in the vicinity of the proposed project.

2. Within the next three years, BLM anticipates the potential for one new mine being constructed in the vicinity of the Proposed Action. BLM has estimated that this potential mine would be expected to disturb approximately 120 acres and remove a total of 150 acres from multiple use until reclamation is completed. The potential mine would use about 125 acre feet of water per year, and employ about 35 workers (all assumed to live in Trona, Ridgecrest, and

surrounding communities). In addition to this potential mine, BLM anticipates that future gold exploration activities would disturb about 50 acres of the western flank of the Panamint Range between Surprise and Goler canyons. These disturbances would be in addition to disturbed areas shown on Table 5.2.

3. The primary cumulative impacts caused by the Proposed Action as well as the potential gold mining and exploration scenario developed by the BLM would be to soils, air, vegetation, wildlife habitat, visual resources, and socioeconomics. The BLM anticipates that key impacts of this gold mining and exploration scenario would be as follows:

   - **Soils** - The potential mine would displace large volumes of soil during the mining process. A large percentage of this soil would be stockpiled for use during reclamation.
   - **Air** - The primary emission to air from these activities would be particulates (dust). Based on EPA estimates, approximately 0.38 tons of particulate matter are put into the atmosphere each year for each acre of surface disturbance. Assuming no reclamation or stabilization of the mining related disturbance in the three-year period, approximately 47.5 tons of particulate matter would enter the atmosphere (125 acres x 0.38 tons/acre/year). The potential future exploration activity encompassing about 50 acres as described in this scenario would be expected to put about 19 more tons of particulate matter into the atmosphere each year (50 acres x 0.38 tons/acre/year). Interim stabilization, concurrent reclamation, watering, chemically treated access roads, etc. would reduce these levels considerably.
   - **Vegetation** - Approximately 125 acres of vegetation would be removed by the potential mine and an additional 50 acres by the potential future exploration. The impacted vegetation community would be primarily creosote bush scrub.
   - **Wildlife** - Cumulative impacts would occur directly to mammals, birds and reptiles, with secondary losses to predators of these animals. There would also be small impacts due to fragmentation of wildlife habitat. Impacts on forage availability would be minor.
   - **Visual** - Cumulative impacts from exploration and mining activity in the area would result in contrast with respect to natural conditions. Successful reclamation would ultimately limit these contrasts.
   - **Socioeconomics** - Mine and exploration personnel associated with the potential future activities would be expected to live in Trona, Ridgecrest and surrounding communities. Overall, socioeconomic impacts of these potential future activities would be beneficial. Some exploration and construction personnel would be expected to stay in local motels. Exploration, construction and operations personnel would be expected to spend money locally for goods and services, with related increases in local revenue, tax base, etc. The level at which these impacts would occur is unpredictable.

CHAPTER 6.0
OTHER REQUIRED CONSIDERATIONS

6.0 OTHER REQUIRED CONSIDERATIONS

1. ~~This chapter focuses on several specific impacts of the Proposed Action in a format required by NEPA and CEQA.~~ This chapter discusses several impacts of the Proposed Action and alternatives as required by NEPA in CEQ regulations 40 CFR 1502.16 and CEQA. These issues are:

   - Relationship Between Short-Term Uses and Long-Term Productivity
   - Irreversible and Irretrievable Commitments of Resources
   - Growth-Inducing Effects ~~of the Proposed Action~~
   - Energy Consumption and Conservation

   The information presented is based upon more detailed discussions in Chapters 4.0 and 5.0.

6.1 RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

~~1. Principal uses of the Briggs Project site include wildlife habitat, mineral exploration and production, and outdoor recreation. The Proposed Action would commit the project site, comprising approximately 940 acres, to a single primary land use for the approximate eight-year period of construction, operation and reclamation.~~

~~2. Following the operational period, the project site would be reclaimed and returned to a passive state. The site would be reopened to recreation uses, and wildlife would be expected to reinhabit the site. Portions of the site would be permanently changed as a result of the mining activities with some related long-term effects on recreation and wildlife habitat. These long-term changes would be compensated through the offsite mitigation measures discussed in Section 2.2.4.~~

~~3. The reclamation plan includes leaving approximately 177 acres of the planned onsite surface disturbance, including the mine pit area (approximately 112 acres) and the waste rock pile slopes (approximately 65 acres), as steep rocky terrain that would not be reseeded or otherwise prepared to promote revegetation. While some plants may become established naturally on these surfaces over time (e.g., on the mine pit benches), substantial revegetation is not expected to occur because of the lack of a soil profile to retain moisture and allow rooting. The reclamation plan incorporates post-mining use of these surfaces for wildlife habitat diversity. These surfaces would be similar to the steep rocky slopes that comprise much of the natural terrain in the eastern portion of the site. Project-related surface disturbances would encompass up to about 135 acres of steep rocky terrain that naturally has minimal vegetation, so the net increase~~

~~in this type of terrain on the project site after reclamation would be about 42 acres. As discussed in Section 2.2.4, offsite reclamation would be designed to compensate, both in quantity and quality, for onsite disturbances that are not revegetated as part of reclamation.~~

~~4. Except for the areas of the mine pit and waste rock pile slopes, reclamation would include measures to maximize the potential for long-term reestablishment of native vegetation communities similar to those existing at the site. Based on natural revegetation at historic mining areas in eastern California deserts, substantial restoration of native community plant density and species diversity may take several decades.~~

1. The proposed Briggs Project occupies a project site that encompasses about 940 acres. Within this project site, approximately 505 acres are proposed to be disturbed under the Proposed Action. Prior to conducting mineral exploration, the project site was used by wildlife for habitat and recreationists for dispersed uses. Although the subject lands are managed by BLM under multiple use, it is expected to be solely utilized for mineral exploration and development purposes for the duration of the project life and reclamation efforts. This is mainly due to the nature of this type of activity. Earthmoving activities and equipment and machinery would present clear public health and safety issues if public access and use of the project site is allowed by BLM during mining and reclamation. Allowing such access could conflict with and violate federal and state safety laws.

2. After completion of the operations and reclamation, portions (waste dump, access roads and ancillary facilities sites) of the disturbed project site would be returned to a land management state similar to predisturbance conditions. Other portions of the disturbance (open-pit, heap leach pile) would not be returned to a land management state similar to predisturbance conditions, but would be left in a manner (consistent with regulatory requirements) that minimizes degradation to the environment.

3. The Proposed Action contains provisions to address these long-term impacts of the project. An offsite mitigation assistance plan has been developed to assist BLM in the multiple use management of the south Panamint Range. These measures, if successfully implemented, would offset by some degree the long-term impacts of unrevegetated disturbance left after completion of operations as discussed in Section 2.2.4.

~~5.~~4. The Proposed Action would result in reduced habitat productivity in areas of surface disturbance for as long as several decades until native vegetation density and diversity can reestablish

through natural processes. Over the long term, habitat productivity would be restored to approximate natural conditions in revegetated areas of the site as the natural plant community is reestablished. For the 177 acres of the site that would not be revegetated, the habitat reestablished over the long term would have some differences as compared to the natural rocky slopes in the area. However, with ~~compensation~~ the offset provided through offsite mitigation, there would be no net regional habitat productivity loss.

~~6. The mine pit and waste rock pile slopes could be used by small mammals and reptiles, and other wildlife utilizing the natural rocky slopes in the area. The mine pit would also offer habitat for raptors and, on occasions when standing water occurs on the pit bottom following rainstorms, various other animals that may water there. The primary long-term changes in wildlife habitat would be the intermittent occurrence of a water source in the pit bottom (as discussed in Section 4.3, rainwater that would collect in the pit bottom would be of suitable quality for wildlife use) and an increase of about 42 acres in rocky slopes in the immediate area. Reptiles, rodents, birds and other native wildlife would be expected to reoccupy the site over time following cessation of mining activities.~~

~~7.~~5. The mine pit and waste rock piles would permanently occupy about 110 acres of the existing alluvial fan surface, directly diminishing recreational values of these areas because the steep slopes of these features would limit access and the variety of possible uses. The portion of these features that occur on naturally steep topography (about 135 acres) would not substantially limit post-mining recreation compared to existing conditions. Offsite mitigation, as discussed in Section 2.2.4, would offset the impact to long-term multiple use opportunities. The offsite mitigation program would enhance multiple use opportunities of public lands in the vicinity through the reclamation of existing disturbances.

~~8.~~6. Manly Fall, a hiking destination, and the hiking trail around Manly Fall providing access to Redlands Canyon from the project area, would be removed by the Proposed Action.

~~9. Reclamation would include measures to minimize the potential risks to health and safety of recreationists. These measures would include efforts to discourage access to the mine pit (e.g., providing barriers to prevent vehicle travel on reclaimed access roads) and leaving slopes in a stable configuration. The slope hazards associated with the site following reclamation would not be unlike natural conditions in the area, which demand the use of caution and good judgment by recreationists.~~

~~10. Justification for the Briggs Project includes some of the economic and social effects. As discussed in Chapter 1.0, the operational phase of the Briggs Project would provide about 130 direct jobs and an estimated 160 indirect jobs. The average annual economic contribution of the Briggs Project would be about $23 million, including payroll, goods and services purchased, and taxes. The gold produced would be available in the market for economic needs and production of jewelry, electronic circuitry, heat-reflective coatings, medicines and other uses common in modern society.~~

6.2 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

1. Extraction of the ore would gradually diminish the value of the Briggs ore body until it could no longer be economically mined at current gold prices. This would represent an irreversible development of known gold reserves. Instead of being present as reserves, the gold resource would be available for use by society.

2. The irretrievable commitment of resources during construction and operation would involve the use of energy and materials. Energy would be expended in the form of diesel fuel, gasoline, and oil for mining equipment, power production, and transportation vehicles. Materials used for construction would include wood, aggregate, plastics, steel, aluminum, and other metals. The major commitments of materials during operations would include processing reagents, explosives, cement and/or lime for agglomeration and pH adjustment, and tires for equipment. At completion of the Briggs Project, major processing facilities, structures, and equipment would be removed from the site for potential use at other locations.

3. Over the eight-year period of construction, operation and reclamation, the Briggs Project would consume a total of up to 5,100 acre-feet of water that is currently in storage in the Panamint Valley basin. This would not represent an irreversible or irretrievable commitment of resources because this water would be replaced by natural recharge that would occur concurrent with and following ground water pumping. The planned project water withdrawal rate is about 3 percent of the estimated rate of recharge to the Panamint Valley basin, and there is very little current use of ground water in the basin. As discussed in Section 4.3.1.1, measurable effects of water withdrawal would be limited to a small part of the basin and the water level in this area would recover to approximate existing conditions within a short period of time (i.e., about 2.4 years) after pumping is stopped.

4. ~~The Briggs Project would irreversibly change the visual character of the site. Nearby viewers would notice contrasts in color and landform of project features relative to the surrounding environment.~~ The proposed Briggs Project would irreversibly change the visual character of the front range escarpment in the vicinity of the project site. Disruption of the visual setting would be the result of the proposed disturbance. Manly Fall would be eliminated by the proposed mine pit.

5. ~~Design parameters for the Briggs Project would include provisions to reduce the potential for environmental accidents. Structures would be designed to withstand the effects of ground shaking as required by the UBC and other applicable local seismic codes and ordinances. Rules and regulations set forth by the BLM, RWQCB, and other agencies would be followed to mitigate any significant threat to environmental health and safety.~~

6.3 GROWTH-INDUCING EFFECTS OF THE PROPOSED ACTION

1. The Proposed Action would be self-supporting for utilities and services. No utilities or services would be extended that could be used by other developments. Based on the general absence of public utilities and services, and the isolated project location, it is not anticipated that the project could indirectly induce population growth into the vicinity.

2. It is expected that the growth-inducing effects of the Briggs Project would be limited to the housing demand for employees, and secondary economic growth from expenditures by the project and its employees. The Briggs Project would provide employment for about 130 persons for the life of the project. It is expected that most of these employees would be hired from the resident workforce. Unemployment statistics discussed in Section 3.12 indicate that there is a workforce available.

3. It has been determined that existing residential areas are adequate to meet the need for employee housing. Expenditures made by Briggs Project employees would create some secondary (indirect) employment in the retail trade and services industries, but is expected that these positions would be accommodated primarily by the existing labor market of the region. While it is possible that a few residences could be developed at, or near the population centers of Ridgecrest, China Lake, and Trona. It is unlikely that the Briggs Project would have substantial growth-inducing effects.

6.4 ENERGY CONSUMPTION AND CONSERVATION

1. Construction and operation of the proposed Briggs Project would result in consumption of non-renewable energy resources. These resources would primarily include petroleum products such as diesel fuel, gasoline and propane. Operation of heavy equipment and machinery for electric power generation is estimated to require about 365,000 gallons of diesel fuel per month. Consumption of gasoline which would be used for light vehicles is estimated at about 15,000 gallons per month. Propane for boilers, furnaces and other needs would be consumed at a rate of about 7,000 gallons per month.

2. Fuel consumption of heavy mining equipment would be the largest single energy requirement. Therefore, one of the primary opportunities for energy conservation would be regular maintenance of vehicles and equipment to maximize fuel efficiency. The Briggs Project has been designed for operational efficiency, including measures such as minimizing haul road travel distances to reduce fuel consumption.

CHAPTER 7.0
TERMS AND ABBREVIATIONS

7.0 TERMS AND ABBREVIATIONS

7.1 DEFINITION OF TERMS

1. The definitions below are provided as clarification for terms used in this document.

TERM	DEFINITION
Active fault	Fault with recent seismic activity as to have displaced Holocene materials (up to 10,000 years old).
Activated carbon	A mostly pure carbon product that has been treated in a kiln to remove impurities and maximize its adsorption capacity.
Adsorb	A chemical process where a molecule attaches loosely to the surface of another phase, without becoming incorporated into that phase.
Adit	A surface opening to an underground mine.
Agglomeration	The process by which fine particles of crushed rock are bound to larger pieces of crushed rock so that fine particles within the heap leach pad do not inhibit percolation of leach solutions.
Average Daily Traffic (ADT)	The average number of vehicles passing a traffic count location.
Alluvium	A general term for geologic materials deposited by running water (e.g., streams, rivers). The term applies to deposits of recent time that have not been consolidated and cemented into rock.
Amphibolite-gneiss	A dark colored coarse-grained metamorphic rock that is low in silica content.
Ancillary facilities	Support structures and equipment.
ANFO	A slurry of ammonium nitrate and fuel oil, used as an explosive.
Area of Critical Environmental Concern (ACEC)	Area where special management is required to protect and prevent irreparable damage to: (1) important historic, cultural, or scenic values; (2) fish and wildlife resources; or (3) other natural systems or processes.
Authority to Construct	Written permit which must be obtained from the APCD prior to construction, alteration, or replacement of any article, machine, or equipment which may emit air contaminants or affect in any way the emission of those contaminants.
Bajada	A sloping ground surface comprised of a series of merged alluvial fans.
Barren solution	Non gold-bearing cyanide solution.
Baseline data	Data gathered to describe the conditions that exist before an action is taken.
Bedding	Layered structure of geologic deposits.
Beneficiation	The preparation and treatment of ore for recovery of mineral commodities. Beneficiation includes, but is not limited, to crushing, sizing, drying and leaching.

TERM	DEFINITION
Berm	An elongate earthen structure, which acts as a barrier, for example, to make it difficult for a vehicle to cross, or to redirect the flow of water.
Borrow	Excavation of soil or rock material for construction use.
California Desert Conservation Area (CDCA) Plan	BLM program which provides for the managed use of desert public lands and resources to safeguard the environmental, cultural, and aesthetic values.
California Endangered Species Act (CESA)	Legislation enacted in 1984 to protect floral and faunal species by listing them as "rare," "threatened," "endangered," or "candidate" and providing a consultation process for the determination and resolution of potential adverse impact to the species.
California Environmental Quality Act (CEQA)	Legislation enacted in 1970 to protect the quality of the environment for the people of California through requiring public agencies and decision makers to document and consider the environmental consequences of their actions.
Carbon column	A container in which the carbon adsorption process takes place. Typically the column will be a cylindrical vessel 5 to 6 feet in diameter and up to 15 feet high, filled with activated carbon. The gold-bearing solution is introduced into the vessel, gold from solution adsorbs onto the activated carbon, and the barren solution exits the vessel.
Carbon reactivation	A process in which used carbon is heated to high temperature to restore its adsorption capability.
Cenezoic	The era of geologic time from 65 million years ago up to the present. It includes the Quaternary and Tertiary periods.
Colluvium	Generic term for unconsolidated rock fragments and soil deposited by gravity and/or water.
Cone of depression	The depression produced in a water table or potentiometric surface by pumping.
Contrast	The effect of a striking difference in form, line, color, or texture of a landscape's features.
Cumulative impacts	Two or more individual effects which, when considered together, compound or increase the impact.
Cyanide	A chemical compound comprised of carbon and nitrogen. Cyanide is water-soluble and is used in ore processing solutions to extract gold from crushed rock.
Desorb	The reverse of the adsorption process.
Detachment fault	A low-angle (subhorizontal) fault across which there has been displacement of geologic materials due to extensional tectonic forces.
Discretionary actions	For the purpose of CEQA, these are actions or approvals by governmental agencies or boards that require the exercise of judgment or deliberation when making a decision to approve, deny, or approve with conditions, a proposed project.

TERM	DEFINITION
Doré	A French term used to describe metal bars comprised mostly of gold and silver with some impurities.
Drawdown	The lowering of the water table or potentiometric surface caused by extraction of ground water.
Drip irrigation	A process of distributing cyanide solution across the top of the leach pile in order that gold may be leached from the ore. The process uses plastic tubing approximately 1/2-inch in diameter. A small opening about every 18 to 36 inches along the length of the tubing allows a small quantity of processing solution to drip out of the tube.
Dust palliative	A compound used to reduce fugitive dust. Dust palliatives include water, water/surfactant mixtures, emulsion compounds, etc.
End-dumping	The process of dumping ore from the back of a dump truck. Waste rock piles are constructed by backing a dump truck on the top surface of a pile to the edge of the pile, and end-dumping the waste rock over the side of the pile.
Effects	Effect and impact are synonymous as used in this report. Direct or primary impacts are those caused by the project and occur at the same time and place. Indirect, or secondary, effects are those which result from the project which occur later in time or farther removed in distance or time, but are still reasonably foreseeable.
Endangered Species Act (ESA)	Federal legislation enacted in 1973, as amended, that extends legal protection to plants and animals listed as "threatened" or "endangered" and includes consultation with the FWS.
Endangered species	An animal or plant species which is in danger of extinction throughout all or a significant portion of its range, as defined in the ESA Amendments of 1982 and by the CESA of 1984.
Environment	The physical conditions which exist within the area which will be affected by a proposed project or alternative, including but not limited to land, air, water, minerals, flora, fauna, ambient noise, and objects of historical or aesthetic significance. The environment includes both natural and man-made conditions.
Environmental Impact Report (EIR)	A detailed report prepared under the CEQA describing and analyzing the significant environmental effects of a project and discussing ways to mitigate or avoid the effects. An EIR is prepared for use by the public, public agencies and agency decision makers to weigh the environmental consequences of a proposed action.
Environmental Impact Statement (EIS)	An analytical document prepared under NEPA that portrays potential impacts to the human environment of a particular course of action and its possible alternatives. An EIS is prepared for use by the public, public agencies, and agency decision makers to weigh the environmental consequences of a proposed action.

TERM	DEFINITION
Ephemeral stream	A stream or portion of a stream which flows only in response to precipitation. Such flow is usually of short duration.
Evapotranspiration	The process by which water is returned to the air through direct evaporation or by transpiration of vegetation, with no attempt being made to distinguish between the two.
Fault	A surface or zone along which there has been displacement of the geologic materials on either side relative to one another as a result of seismic activity.
Feasible	Capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors.
Flux	A mineral added to a furnace charge to promote the fusing of metals and aid flow.
Freeboard	Height of containment above the surface of contained liquid.
g	The acceleration of gravity (32.2 ft/sec^2).
Geonet	A coarse plastic net used as a fluid drainage layer in engineering systems.
Geotextile	A fabric-like material designed for various uses in engineered earth structures. Common uses include wrapping or covering of materials to be buried to prevent their physical damage, incorporation into fills to spread load distribution, and use as a filter medium to capture fine particles.
Gneiss	A coarse grain metamorphic rock.
Ground water	Water found beneath the land surface, in the zone of saturation below the water table.
Growth media	Geologic and organic materials, including soils, that are suitable for use in growing plants.
Habitat	The place where an animal or plant normally lives, often characterized by a dominant plant and co-dominant form, such as creosote bush habitat.
Haul road	A road used by large (50- to 100-ton capacity) trucks to haul ore and waste rock from the open pit to other locations.
Hazardous material	A substance which, because of its potential for either corrosivity, toxicity, ignitability or chemical reactivity may cause injury to persons or damage to property.
Head (static)	The height of fluid above a reference point (e.g., a plastic liner). The head is the driving force that exerts pressure and causes fluid to migrate.
Heap	A pile of crushed ore underlain by a liner system engineered to collect the leach solutions. Care is taken during the placement of the crushed ore so as to avoid compaction, in order that the leach solutions can flow freely through the ore to extract the gold.

TERM	DEFINITION
Holocene	The epoch of the Quaternary period of geologic time from 10,000 years ago to the present.
Infiltration	Downward movement of water through the soil surface into the ground.
Initial study	A preliminary analysis prepared by the lead agency to determine whether an EIR or a Negative Declaration must be prepared or to identify the significant environmental effects to be analyzed in an EIR.
Jurisdictional wetlands	Wetland subject to regulation under the Clean Water Act.
Lacustrine	From a lake.
Leachate collection and recovery system (LCRS)	A term used to describe the assembly of components installed for the purpose of capturing fluids to minimize or eliminate the hydraulic head over a liner system.
Leaching	A process by which gold is extracted from ore using a dilute cyanide solution.
Lead agency	The public agency which has the principal responsibility for carrying out or approving a project (14 CCR 15367). The agency or agencies preparing or having taken primary responsibility for preparing the environmental impact statement (40 CFR 1508.16).
Lime	A calcium oxide compound that is used for pH control in the leaching process.
Listric fault	A fault that becomes progressively more horizontal with depth.
Magazine	A storage room for explosives. Magazines are built to specifications set by the MSHA and are usually located in a secure but remote area of the project site.
Mesozoic	The era of geologic time from 65 to 230 million years before present.
Metamorphic rock	Rock that has been altered by heat, pressure and/or ion exchange with geothermal fluids.
Metasedimentary rock	Metamorphic rock of sedimentary origin.
Metavolcanic rock	Metamorphic rock of volcanic origin.
Microcatchment	A graded surface designed to collect rainfall and control the runoff to drain to one or more low points.
Mine pit	Area from which ore and waste rock are removed.
Miocene	The epoch of the Tertiary period of geologic time encompassing the period between 5 and 23 million years before present.

TERM	DEFINITION
Mitigation	A method or procedures which may: (1) avoid an impact altogether by not taking a certain action or parts of an action; (2) minimize impacts by limiting the degree or magnitude of the action and its implementation; (3) rectify the impact by repairing, rehabilitating, or restoring the ~~impacted~~ affected environment; (4) reduce or eliminate the impact over time by preservation and maintenance operations during the life of the action; and (5) compensate for the impact by replacing or providing substitute resources or environments.
Multiple Use	The management of the public lands and their various resource values so that they are utilized in the combination that will meet the present and future needs of the American people; making the most judicious use of the land for some or all of the resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; the use of some land for less than all of the resources; a combination of balanced and diverse resource uses that takes into account the long-term needs of future generations for renewable and nonrenewable resources including, but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish and natural scenic, scientific and historical values; and coordinated management of the various resources without permanent impairment of the productivity of the land and the quality of the environment, with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output.
National Environmental Policy Act (NEPA)	Legislation enacted in 1969 that require federal agencies to include in their decision-making processes: (1) appropriate consideration of all environmental effects; and (2) procedures to avoid or minimize adverse effects; and restore and enhance environmental quality as much as possible.
Notice of Preparation	A brief notice sent by the public agency with principle responsibility for carrying out or approving a project to notify other agencies that an EIR is being prepared under CEQA.
Notice of Intent	~~Similar to the Notice of Preparation, used to notify other agencies and the public that an EIS is being prepared under NEPA~~. A notice that an environmental impact statement will be prepared and considered. This is the NEPA-equivalent to a Notice of Preparation.
Ore	Rock that can be mined for extraction of a mineral ~~commonly~~ commodity under conditions that allow a profit to be made.
Ozone (O_3)	An end product of complex reactions between ROG and (or non-methane hydrocarbons) and NO_X in the presence of ultraviolet radiation.
Palliative	See dust palliative.
Piezometer	A well used for measuring the elevation of the ground water surface.

TERM	DEFINITION
Playa	The normally dry floor of a valley with closed surface drainage where water collects and evaporates. Also known as an alkali flat.
Pleistocene	The epoch of the Quaternary period of geologic time between 10,000 years and 1.8 million years before present.
Pliocene	The epoch of the Tertiary period of geologic time between 1.8 and 5 million years before present.
Prevention of significant deterioration (PSD)	A term used to describe an air quality permitting process that is triggered by any project that emits certain pollutants above levels prescribed by law.
Patented claims	Mining claims for which the United States government has conveyed the fee simple interest in the surface and minerals into private ownership.
Permeability	A measure of the relative ease with which a porous medium can transmit a liquid under a potential gradient.
Precambrian	The era of geologic time up until 570 million years before present.
Pregnant solution	A gold-bearing, water-based sodium or calcium cyanide fluid which contains sufficient quantities of gold that it can be sent to the processing plant to recover the gold.
Process facilities	As used in this document, generally means the stationary equipment and facilities used to prepare the ore for leaching and extract gold.
Project	The whole of an action, which has a potential for resulting in a physical change in the environment.
Proterozoic	The portion of the Precambrian Era between about 570 and 2600 million years before the present.
Protore	Material which does not contain sufficient gold to be economically processed using present technology, but which, given favorable changes to gold price or processing technology, could be economically recoverable in the future. Such material is usually segregated into a stockpile so that they will be readily accessible in the future.
Pseudostatic analysis	Static analysis of slope stability that incorporates a simulated horizontal force equal to the horizontal acceleration of the design earthquake times the mass of the potential sliding material.
Pseudostatic factor of safety	The ratio of forces contributing to slope stability (e.g., intergranular friction and cohesion) versus forces working against slope stability (e.g., gravity, seismic acceleration) for a simulated seismic load. A pseudostatic factor of safety equal to one indicates that these forces are equal and slope movement may occur.

TERM	DEFINITION
Public land	Any land and interest in land owned by the United States within the several states and administered by the Secretary of the Interior through the BLM, without regard to how the United States acquired ownership, except: (1) lands located on the Outer Continental Shelf; and (2) lands held for the benefit of Indians, Aleuts, and Eskimos.
Quaternary	The period of the Cenazoic Era of geologic time between 1.8 million years ago and the present. The Quaternary period includes the Pleistocene and Holocene epochs.
Rare species	A species which, although not presently threatened with extinction, is in such small numbers throughout its range that it may become endangered if its present environment worsens.
Reactivation kiln	The equipment used in gold processing to heat the carbon to restore its capability to adsorb gold from cyanide solution.
Recharge	Process by which water infiltrates and is added to an aquifer, either directly or indirectly by way of another rock formation. This term can also be used in reference to the water itself.
Responsible agency	The organization that has the legal duty to ensure that a project complies with the appropriate rules and regulations.
Right-of-way	The right to pass over property owned by another. The strip of land over which facilities such as roadways, railroads, or power lines are built.
Run-of-mine	Refers to ore that has been broken by blasting, before it has been crushed and screened.
Saturated zone	Zone in which all the connected interstices or voids in rock or soil are filled with water under pressure equal to, or greater than, atmospheric pressure. The water table is commonly considered to be at the top of the zone of saturation.
Seismicity	Oscillation of the ground resulting from shifting of the earth's crust.
Sensitive species	Generic term for any plant or animal species which is recognized by the government or conservation group as being depleted, rare, threatened, or endangered.
Significant effect	A substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance (14 CCR 15382). Requires consideration of both context and intensity. Under the federal definition, there may be a significant beneficial impact (40 CFR 1508.27).
Specific capacity	The rate of discharge of a water well per unit of drawdown.

TERM	DEFINITION
Specific yield	The ratio of: the volume of water which the rock or soil, after being saturated, will yield by gravity, to the volume of the rock or soil. The definition implies that gravity drainage is complete. In the natural environment, specific yield is generally observed as the change that occurs in the amount of water in storage per unit area of unconfined aquifer as the result of a unit change in head. Such a change in storage is produced by the draining or filling of pore space and is therefore dependent upon particle size, rate of change of the water table, time, and other variables. Hence, specific yield is only an approximate measure of the relation between storage and head in unconfined aquifers. It is equal to porosity minus specific retention.
Static water level	The level at which water stands in a non-pumping well; the pre-pumping level.
Storativity (or storage coefficient)	The volume of water that can be released from storage per unit surface area of a saturated aquifer, per unit decline in the component of hydraulic head normal to the surface. In an unconfined water body, the storativity is virtually equal to the specific yield.
Stripping vessel	The vessel in which gold is removed (stripped) from the activated carbon. The stripping chemical is a concentrated solution of sodium cyanide and caustic soda. After it has been stripped free of the adsorbed gold, the carbon is sent to the reactivation kiln to regenerate its capacity to adsorb gold.
Subsidence	Sinking or settlement of the land surface, due to any of several processes but frequently from the removal of ground water. As commonly used, the term relates to the vertical downward movement of natural surfaces, although small-scale horizontal displacement also may be present.
Surfactant	One of a number of chemicals which, when added in minute quantities to water, reduces the surface tension of the water, thereby improving its efficiency as a wetting agent.
Talus	Unconsolidated rock fragments and soil debris deposited on or at the base of slopes due to gravity.
Tertiary	The period of the Cenazoic Era of geologic time between 1.8 and 65 million years before present.
Transmissivity	Ability of a rock to transmit water under hydraulic head.
Threatened species	Species which, although not presently threatened with extinction, is likely to become endangered in the foreseeable future in the absence of special protection and management efforts.
Unconfined water	Ground water not under artesian conditions. Generally used to describe water that does not rise above the level at which it is first found, at the time it is found. Seasonal changes in both unconfined and confined water levels may take place as a result of variations in recharge and discharge.

TERM	DEFINITION
Unsaturated zone	Zone in which the connected interstices or voids in a permeable rock are not filled with water and there can be movement of air. Generally, the zone between the land surface and the water table, but a zone of aeration can exist below an artesian aquifer, and below a perched water body.
Unusual plant assemblages (UPAs)	Stands of vegetation identified in the CDCA which can be recognized as extraordinary due to one or more factors, which are unusual age, unusual size, unusually high cover or density, or disjunction from main centers of distribution.
Visual Resource Management	The systematic means to identify visual values, establish objectives which provide the standards for managing those values, and evaluate the visual impacts of proposed projects to ensure that BLM objectives are met.
Waste rock	Rock which contains either no gold or gold in quantities that cannot be economically extracted. Because such rock either lies on top of ore or is mixed in which the ore, waste rock must be mined in advance of or at the same time as the ore is mined.
Wilderness Study Area (WSA)	A roadless area of public lands which the BLM has determined may possess the wilderness qualities described in the Wilderness Act of 1964. WSAs were established in order to study the suitability of the areas for possible designation as wilderness by Congress. BLM protects each WSAs wilderness qualities until Congress decides whether or not the WSA will be designated as wilderness.

7.2 DEFINITION OF ABBREVIATIONS

1. The definitions below are provided as clarification for abbreviations used in this document.

ABBREVIATION	DEFINITION
ACEC	Area of Critical Environmental Concern
ACHP	Advisory Council on Historic Preservation
A-C Power	A-C Power - ACE Operations Cogeneration Plant
ADT	average daily traffic
Air Basin	Great Basin Valleys Air Basin
ANFO	ammonium nitrate/fuel oil
AP	acid generating potential
APCD	Great Basin Unified Air Pollution Control District
BACT	Best Available Control Technology
BLM	U.S. Bureau of Land Management
CAAQS	California Ambient Air Quality Standards
Canyon	Canyon Resources Corporation and/or CR Briggs Corporation

ABBREVIATION	DEFINITION
CARB	California Air Resources Board
CCR	California Code of Regulations
CDCA	California Desert Conservation Area
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CLNAWS	China Lake Naval Air Weapons Station
cm/sec	centimeter per second
CNDDB	California Natural Diversity Data Base
CNPS	California Native Plant Society
CO	carbon monoxide
COE	U.S. Army Corps of Engineers
County	County of Inyo
CUP	Conditional Use Permit
DEHS	County Department of Environmental Health Services
DFG	California Department of Fish and Game
DHS	California Department of Health Services
DMG	California Division of Mines and Geology
DPA	Desert Protection Act
DTSC	California Department of Toxic Substances Control
DVNM	Death Valley National Monument
DWR	California Department of Water Resources
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EMT	Emergency Medical Technician
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
°F	degrees Fahrenheit
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FLPMA	Federal Land Policy Management Act
FML	flexible membrane liner
FWS	U.S. Fish and Wildlife Service

ABBREVIATION	DEFINITION
gpd	gallons per day
gpm	gallons per minute
H_2S	hydrogen sulfide
HCN	hydrogen cyanide gas
HDPE	high density polyethylene
IMP	Interim Management Policy
kw	kilowatts
LCRS	leachate collection and recovery system
M	magnitude
Ma	million years ago
MCE	maximum credible earthquake
MCL	Maximum Contaminant Level
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MPE	maximum probable earthquake
mph	miles per hour
MSHA	Mine Safety and Health Administration
MSL	mean sea level
mw	megawatt
NAAQS	National Ambient Air Quality Standards
NACC	North American Chemical Corporation
NCDC	National Climatic Data Center
NEPA	National Environmental Policy Act
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NH_3	Ammonia
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration
NO_2	nitrogen dioxide
NO_X	oxides of nitrogen
NP	neutralization potential
NPDES	National Pollution Discharge Elimination System
NPPA	California Native Plant Protection Act
NPS	National Park Service - Death Valley National Monument
NRHP	National Register of Historic Places

ABBREVIATION	DEFINITION
NSPS	New Source Performance Standards
O_3	ozone
OLSAC	Owens Lake Soda Ash Company
OSHA	Occupational Health and Safety Administration (federal)
PG&E	Pacific Gas & Electric
PM_{10}	suspended particulate matter less than 10 microns in aerodynamic diameter
ppm	parts per million
PSD	prevention of significant deterioration
PVC	polyvinyl chloride
RCRA	Resource Conservation and Recovery Act
ROG	reactive organic gas
RWQCB	California Regional Water Quality Control Board - Lahontan Region
SAR	soil adsorption ratio
SCE	Southern California Edison
SCR	Selective Catalytic Reduction
SCS	U.S. Soil Conservation Service
SHPO	State Historic Preservation Officer
SMARA	Surface Mining and Reclamation Act of 1975
SO_2	sulfur dioxide
SPCC	Spill Prevention, Control, and Countermeasure Plan
SVPA	Searles Valley Planning Area
STLC	Soluble Threshold Limit Concentrations
SWRCB	State Water Resources Control Board
TDS	total dissolved solids
tpd	tons per day
TSS	total suspended solids
TTLC	Total Threshold Limit Concentration
UBC	Uniform Building Code
UPA	Unusual Plant Assemblages
USGS	U.S. Geological Survey
VOC	volatile organic compounds
WSA	Wilderness Study Area
WHMA	Wildlife Habitat Management Area
~~WMA~~	~~Wildlife Management Area~~

CHAPTER 8.0
LIST AND QUALIFICATIONS OF PREPARERS

8.0 LIST AND QUALIFICATIONS OF PREPARERS

1. This chapter is included pursuant to 40 CFR 1502.17 and 14 CCR 15129. This Draft EIS/EIR has been prepared by BLM and the County with the assistance of Environmental Solutions, Inc., ~~under the direction of BLM and the County.~~ The BLM, County, NPS and the COE provided information and assistance in preparing this report and independently evaluated the information contained herein.

2. Agency personnel that participated in the preparation of this document include:

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  - Ahmed Mohsen - Resource Management Specialist, EIS Team Leader, Ridgecrest Resource Area
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  - Molly Brady - Planning and Environmental Coordinator, Riverside District Office
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  - Jim Hamilton - Mining Engineer, California State Office
  - John Willoughby - Range Conservationalist, California State Office
  - Dick Forester - Hazmat Specialist, California State Office
- **County of Inyo**
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  - Charles S. Thistlethwaite, A.I.C.P. - Senior Planner
  - Earl Gann - Mining Engineer
  - ~~Randy Jackson - County Hydrologist~~
  - ~~Sally Manning - Vegetation Specialist~~
  - Antonio Rossman, Esq. - Independent Counsel
- **National Park Service**
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  - Richard Anderson - Environmental Specialist, Death Valley National Monument
  - Douglas Threloff - Natural Resource Specialist, Death Valley National Monument
  - Mel Essington - Mining Engineer, Death Valley National Monument
  - David Shaver - Chief, Mining and Minerals Branch
  - Kerry Moss - Mining and Minerals Branch

- Sid Covington - Mining and Minerals Branch
- Erik Hauge - Environmental Specialist, Air Quality Division

- **U.S. Army Corps of Engineers**
  - Tiffany Welsh - Ecologist

3. The following staff of Environmental Solutions, Inc., participated in the preparation of this document:

- **Ian P.G. Hutchison**

  Project Director
  Ph.D., P.E., Civil (Hydrology) Engineering, University of Witwatersrand, 1976
  G.D.E. (Masters Equivalent) Civil Engineering (Geotechnical/Hydrology), University of Witwatersrand, 1974
  B.S., Civil Engineering, University of Cape Town, 1967

  Over 20 years of experience in engineering and management related to environmental aspects of mining and other industries. Experience includes:
  - Management of the preparation of CEQA/NEPA Environmental Analyses and industrial facility permitting.
  - Management of design and construction for mine site environmental protection systems throughout the United States.
  - Water resource development, water quality evaluations, environmental compliance, and site remediation.
  - Author of many publications on mining-related waste management and surface and ground water issues.

- **Joseph L. Stenger**

  Project Manager
  B.S. Geology, University of California, Santa Cruz, 1985

  Nine years experience in performing and managing environmental projects including:
  - EIS, EIR and Environmental Assessment analyses for major gold mining facilities in California and Nevada.
  - Geologic, hydrogeologic and geochemical analyses for technical reports supporting CEQA/NEPA documents and other permitting requirements.
  - Environmental compliance auditing.
  - Industrial facility permitting and related preliminary design and planning.

- **David E. Brown**

  Project Manager
  M.S. Geography, University of California, Riverside, 1984
  B.S. Geography, University of California, Riverside, 1980

  Ten years experience as project manager for various projects including:
  - Management of over 30 NEPA/CEQA documents for a variety of projects.
  - Management of permitting activities, planning and design services, and preliminary engineering for projects ranging from mining to solid waste landfills.

- Development of technical reports for EIS/EIR addressing socioeconomic and cost/revenue studies, land use consistency evaluation, and visual impact analysis.

- **JoAnn C. Hadfield**

  Senior Project Scientist
  B.S. Urban Planning, University of Utah, 1976
  Completion of Civil Engineering Coursework, San Diego State University, 1984
  Engineer in Training Certificate (1986)

  Fourteen years of planning and environmental experience including:

  - Preparation and/or management of over 60 CEQA documents encompassing a diversity of project types and scales.
  - Consultation to public agencies for objective third-party review of CEQA documents, and provision of CEQA training for public sector staff.
  - Development of focused environmental studies including opportunities and constraints analysis, biological studies, and infrastructure capacity evaluation.

- **Thomas L. Patterson**

  Senior Project Scientist
  Ph.D. Atmospheric Chemistry, University of Rhode Island, 1988
  B.A. Chemistry/Biochemistry, University of California, San Diego, 1983

  Three years experience as project scientist including:

  - Preparation of air permit applications which included impact analyses, air dispersion modeling and development of monitoring plans.
  - Preparation of risk assessments related to the effects of air, soil, and/or ground water contamination.
  - More than ten years experience in studying and evaluating environmental chemistry issues, such as fate and transport.

- **Kathleen A. Bergin**

  Principal Archaeologist
  M.A. Anthropology, University of Nevada Las Vegas, 1982
  B.A. Anthropology, University of Nevada Las Vegas, 1975

  Eighteen years of experience in archeology, environmental baseline assessment, and impact analysis including:

  - Archaeological/cultural resource/paleontological impact analysis for EISs, EIRs, and EAs.
  - Land use, vegetation, noise, traffic, and aesthetics baseline documentation and impact analyses for EIRs and EAs.
  - Principal Investigator for archival research, surface inventory, testing evaluation, and data recovery of cultural resources sites.
  - Development of mitigation or treatment plans for cultural resources.
  - Regulatory documentation.

- **Carolyn Trindle-Smith**

  Senior Environmental Planner
  M.A. Business Administration, Pepperdine University, 1981
  M.A. Secondary Education, University of Missouri, Kansas City, 1974
  Bachelor of Journalism, University of Missouri, Columbia, 1965

Eighteen years of experience as project manager/environmental planner for various projects including:

- EIS, EIR, and Environmental and Biological Assessments.
- Socioeconomic and planning documents for proposed industrial projects and military installations.
- Preparation and coordination of permits for waste discharge, water quality, air quality, wildlife, and special use permits, as well as Plans of Operation for major mining projects.

- **Massoud Vatankhahi**

  Civil Engineer
  B.S. Civil Engineering, Ohio Northern University

  Over 19 years of hydrology experience at sites throughout California.

- **Richard Nadelson**

  Landscape Architect
  B.S. Plant Science, Rutgers University, 1965
  B.L.A. University of Massachusetts, 1967
  M.L.A. Regional Planning and Landscape Architecture, University of Massachusetts, 1968

  Over 20 years of design development for a wide variety of projects throughout Southern California, Arizona and Washington including:

  - Landfill and mine operational site plans, grading plans, surface drainage plans, and earthwork quantity estimates.
  - Site and development plans, land use and circulation plans, tentative tract maps.

- **C. Marshall Payne**

  Associate Principal Geologist
  M.S. Engineering Geology, University of Arizona, Tucson
  B.S. Geology, Arizona State University, Tempe
  Registered Geologist, Certified Engineering Geologist, Registered Geophysicist

  Over 25 years experience in geologic engineering on a broad scope of projects including:

  - Principal Geologist for site assessments and leachate treatment workplans for major landfills.
  - Geologic, hydrogeologic, and seismic studies for EISs.
  - Principal Geologist for environmental assessment of hydrogeologic conditions on Nevada and California gold mines.
  - Experience in geologic mapping and site characterization for waste facilities.

- **Frank J. Hagar**

  Hydrogeologist
  B.S. Geological Engineering, Colorado School of Mines

  Fifteen years experience in geologic and hydrogeologic studies including mine hydrogeology, engineering geology, well field analysis, well installation, geophysics, statistics, and saturated and unsaturated flow modeling.

- **Deanna M. Kress**

  Scientist/Planner
  B.F.A. Design, California State University, Fullerton, 1989

  Four years experience in preparation of environmental documents including:

  - EIS, EIR, and Environmental and Biological Assessments.
  - Preparation of technical analyses, including evaluations of existing conditions, visual impacts, land use consistency/compatibility, and cumulative impacts.
  - Processing of environmental documentation for NEPA/CEQA compliance.
  - Environmental document quality assurance/quality control and coordination.

CHAPTER 9.0
PERSONS, COMPANIES AND ORGANIZATIONS CONSULTED

10.0 DISTRIBUTION LIST FOR DRAFT EIS/EIR

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Bureau of Land Management
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U.S. Geological Survey
Department of the Interior
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National Biological Survey
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1849 "C" Street, NW
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Library of Congress
Exchange and Gift Division
Monthly Checklist Section
Washington, D.C. 20540

Natural Resources Library
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CHAPTER 11.0
REFERENCES

11.0 REFERENCES

Aguilar, Cheryl. Administrative Clerk No. 1, Interim. Searles Valley Fire Department, Trona, California. Personal Communication, September 21, 1993.

Air Sciences, Inc. *Annual Meteorological and Air Quality Data Report*, January 1993.

Air Sciences, Inc. *Briggs Project Authority to Construct Application*, April 1994.

Air & Waste Management Association (AWMA). *Air Pollution Engineering Manual.* Buonicore and Davis, eds. Van Nostrand Reinhold, New York, August 1992.

Allington, Art. Captain, Kern County Fire Department, A-Shift, Station 77, Ridgecrest, California. Personal Communication, August 31, 1993.

Alvis, Ken. Kern County Department of Solid Waste. Personal Communication, March 18, 1993.

Auld, Bruce. Superintendent, Sierra Sands Unified School District, Ridgecrest, California. Letter dated March 22, 1993.

Bagley, Mark. *Botanical Survey of the Addwest Gold Briggs Project Area, Panamint Valley, California,* July 1989.

Bagley, Mark. *Sensitive Plant Species Survey of the Briggs Project Area, Panamint Valley, California,* May 1993.

Ball, Robert. Kern County Council of Governments. Personal Communication, September 15, 1993.

Beck, Carol. Regional Affairs Manager, Southern California Edison Company, Ridgecrest, California. Letter dated March 15, 1993.

Berkert, R. Kern County Department of Solid Waste. Personal Communication, January 31,1994.

Bjornstead, Lynn. Coldwell Banker Realty, Ridgecrest, California. Personal Communication, May 19, 1993.

Blackwell, Dean. Southern California Edison Company, Ridgecrest, California. Personal Communication, August 24, 1993.

Blake, T.F. *EQSEARCH* (Computer Program). Prepared by Petra Geotechnical, Inc., Costa Mesa, California, 1992.

Bloom, Peter H. Research Biologist, University of California at Santa Cruz. Personal Communication, April 7, 1995.

BLM. See U.S. Bureau of Land Management.

Brattstrom, B.H. and M.C. Bondello. Effect of Off-Road Vehicle Noise on Desert Vertebrates. *Environmental Effects of Off-Road Vehicles, Impact and Management in Arid Regions.* Webb, R.H and H.G. Wilshire, Eds. New York: Springer-Verlag. 534 pages, 1983.

Brown, Patricia E. *Wildlife Survey of the Addwest Gold Briggs Project Area*, September 1989.

Brown, Patricia E. *Winter Bat Survey of Briggs Project*, February 1993a.

Brown, Patricia E. *Spring Bat Survey of the Briggs Project*, 1993b.

Brown, Patricia E. *Summer Bat Survey of Briggs Project,* September 21, 1993c.

Brown, Patricia E. Personal Communication, 1994.

Brown, Patricia E. Personal Communication, February 8, 1995.

Brush, Margaret. Manager, Searles Domestic Water Company, Trona, California. Letter dated March 18, 1993.

California Department of Fish and Game (DFG). *Mammalian Species of Special Concern in California*. Daniel F. Williams, Department of Biological Sciences, California State University, Stanislaus. February 1986.

DFG. *Draft Environmental Document Regarding Bighorn Sheep*. February 16, 1990.

DFG. Correspondence from Fred Worthley, Regional Manager (Region 5). November 4, 1993.

DFG. *Draft Environmental Document Regarding Bighorn Sheep Hunting*. 1994.

DFG. Denyse Racine. Personal Communication, February 15, 1995a.

DFG. Natural Diversity Data Base for the Slate Range Crossing and Manly Fall Quadrangles. 1995b.

California Department of Water Resources (DWR). *Ground Water Occurrences and Quality, Lahontan Ranges*. DWR Bulletin 106-1, page 439, 1964.

DWR. *California's Ground Water*. DWR Bulletin 118 (applicable portions provided), 1975.

California Employment Development Department. Selected Employment Statistics, 1993.

California Fish and Game Commission, and California Department of Fish and Game (DFG). *At the Crossroads: A Report on the Status of California's Endangered and Rare Fish and Wildlife*. December 1980.

Canyon Resources Corporation (Canyon). *Modern Mining Practices* handout. Undated.

Canyon. *Preliminary Plan of Operation and Reclamation*, August 1992a.

Canyon. *Briggs Project Application for Mining Reclamation Plan*, November 13, 1992b.

Canyon. *Briggs Project Application for Conditional Use Permit*, November 13, 1992, revised December 1992c.

Canyon. *Alternatives Study - Briggs Project*, June 1993a.

Canyon. *Briggs Project Plan of Operations*. Submitted to U.S. Bureau of Land Management, Ridgecrest Resource Area, November 1993b.

Canyon. *Briggs Project Application for a Section 404 Permit*, November 1993c.

Canyon. *Briggs Project Application for Mineral Material Sale*. Submitted to U.S. Bureau of Land Management, Ridgecrest Resource Area, March 1994.

Canyon. Comments on Briggs Project Draft Environmental Impact Statement/Environmental Impact Report. State Clearinghouse No. 92122070. Letter to County of Inyo and USDI Bureau of Land Management. November 17, 1994a.

Cedar Creek Associates, Inc. *Description of Vegetation Resources, Briggs Project*, February 1993a.

Cedar Creek Associates, Inc. *Soils Technical Memorandum, Briggs Project*, March 1993b.

Cedar Creek Associates, Inc. *Site Closure and Reclamation Plan for the Briggs Project (Preferred Alternative)*, May 1993c.

Cedar Creek Associates, Inc. Personal Communication with Steve Viert, April 22, 1994.

China Lake Naval Air Weapons Station (CLNAWS). *RESOLVE Project Final Report, Visibility Conditions and Causes of Visibility Degradation in the Mojave Desert of California*. Produced under: Naval Weapons Center, China Lake, July 1988.

CLNAWS. Publication TS 90-39. Published by the Technical Information Department, Naval Weapons Center, China Lake, California, April 1990.

CLNAWS. *Vital Statistics 1992*. NAWS-CL Administrative Publication 005, September 1992.

CLNAWS. J. K. Osgood, Head, Environmental Project Office, Personal Communication, October 1, 1993.

Clark, Daniel G. Deputy Chief, Kern County Fire Department. Personal Communication, March 29, 1993.

Cleary. *CR Briggs Corporation Fault Hazard Investigation of the Briggs Project, Inyo County, California*, May 21, 1993.

COE. See U.S. Army Corps of Engineers.

Copeland, James. Superintendent, Trona Joint Unified School District. Letter dated March 26, 1993.

County of Inyo. *Conservation and Open Space Elements of the Inyo County General Plan*, June 1981.

County of Inyo. Conditional Use Permit Application (CUP #93-6). Submitted to Owens Lake Soda Ash Company, June 1993.

Cox, David. California Energy Company, Omaha Nebraska. Personal Communication, May 24, 1994.

Davis, E.L. *Archaeology of the North Basin of Panamint Valley, Inyo County, California.* Nevada State Museum Anthropological Papers. 15:84-141. Carson City, Nevada, 1970.

Death Valley National Monument (DVNM). Comment letter in response to Notice of Intent, Edwin L. Rothfuss, Superintendent, January 27, 1993.

DFG. See California Department of Fish and Game.

Dobra, John L. *The Economic Impacts of Nevada's Mineral Industry*. Department of Economics, University of Nevada, Reno, February 1988.

DWR. See California Department of Water Resources.

Environmental Solutions, Inc. *Supporting Calculations for the Briggs Project Environmental Impact Statement/Environmental Impact Report*, June 1994.

EPA. See U.S. Environmental Protection Agency.

EremiCo. *Mohave Ground Squirrel (Spermophilus mohavensis) Trapping Survey for Briggs Mining Project, Panamint Valley, Inyo County, California*, June 1993a.

EremiCo. *Biological Survey at Proposed Microwave Telephone Relay Station for Briggs Mining Project, Slate Range, Inyo County, California*, September 1993b.

EremiCo. *Biological Surveys at Proposed Clay Source for Briggs Mining Project, Panamint Valley, Inyo County, California,* October 6, 1993c.

EremiCo. *Letter Report - Snowy Plover Survey, Briggs Mining Project,* May 24, 1994.

Ernst, Pam. Manager, Inyokern Community Services District. Personal Communication, September 1993.

Farlander, Patricia. Executive Vice President, Ridgecrest Chamber of Commerce. Letter dated August 26, 1993.

Fiddament, Karen. Secretary to the Board, Inyokern Chamber of Commerce. Personal Communication, September 9, 1993.

Fowler, Dan. Bureau of Land Management Archaeologist- Ridgecrest Resource Area. Personal Communication, January 28, 1994.

FWS. See U.S. Fish and Wildlife Service.

Garrison, David. Deputy, San Bernardino County Sheriff's Department. Personal Communication, September 9, 1993.

Geochemica, Inc. *Geologic Materials Waste Characterization Report, Briggs Project,* September 1993.

Hamilton, Chuck. Deputy County Administrator, Inyo County Waste Management, Bishop, California. Letter dated March 18, 1993.

Hodges, K.V., L.W. McKenna and M.B. Harding. *Structural Unroofing of the Central Panamint Mountains, Death Valley Region, Southeastern California.* Geologic Society of America. Memoir 176, pages 377-390, 1990.

Horton, Charles M. Superintendent Customer Services, Continental Telephone of California, Victorville, California. Letter dated March 26, 1993.

Hughes, J. U.S. Bureau of Land Management. Personal Communication, January 21, 1994.

Hutchison, Ian P.G. and Richard D. Ellison, eds. *Mine Waste Management.* Sponsored by: California Mining Association, 1992.

Hydro-Geo Consultants, Inc. *Ground Water Supply Study: Aquifer Recovery After Pumping, Canyon Resources Corporation, Briggs Project.* Undated technical memorandum.

Hydro-Geo Consultants, Inc. *Ground Water Supply Study, Briggs Project (Draft).* May 24, 1993a.

Hydro-Geo Consultants, Inc. *Pumping Test Evaluation, Monitoring Well MW-2, Briggs Project.* August 1993b.

Hydro-Geo Consultants, Inc. Letter Report presenting calculations of drawdown due to water supply pumping at the Briggs Project, October 1993c.

Inyokern Chamber of Commerce, Inc. *Community Economic Profile*, 1988.

Jarvis, J. JBR Consultants Group. Personal Communication, January 27, 1994.

JBR Consultants Group (JBR). *Canyon Resources Corporation Briggs, Cecil R and Jackson Claimblocks Biological Surveys, Panamint Valley, California,* June 1991.

JBR. *Panamint Valley Dry Lake Partial Ordinary High Water Mark Determination,* November 1993.

Jennings, C.W. *Preliminary Fault Activity Map of California.* DMG Open File Report No. 92-03, 1992.

Joyner, W.B. and T.E. Fumal. *Predictive Mapping of Earthquake Ground Motion.* USGS Professional Paper 1360, pages 203-220, 1986.

Kliman, L. *Cultural Resources Short Form Report.* On file at the U.S. Bureau of Land Management, Ridgecrest Resource Area Office, Ridgecrest, California, 1983.

Koehler, J.H. and A.P. Ballog, Jr. *Sources of Power Plant Cooling Water in the Desert Area of Southern California - Reconnaissance Department of Water Resources.* Bulletin 91-24, 1979.

LaBerteaux, Denise. *Birds of the Addwest Gold, Inc., Panamint Valley Project Site*, June 1989.

Lemaster, S. Administrative Secretary, San Bernardino County Fire Department. Personal Communication, January 13, 1995.

Lennon, Thomas. Letter Report: *Results of Class III Inventory Survey of Proposed Repeater Facility Site*. Submitted to Canyon Resources, Golden, Colorado. Prepared by Western Cultural Resource Management, Inc., Boulder, Colorado, August 9, 1993a.

Lennon, Thomas. Letter Report: *Results of Survey of Potential Clay Sources*. Prepared by Western Cultural Resource Management, Inc., Boulder, Colorado, Amended October 24, 1993b.

Lobotka, T.C., A.L. Albee, M.A. Lamphere and S.D. McDowell. *Stratigraphy, Structure and Metamorphism in the Central Panamint Mountains (Telescope Peak Quadrangle), Death Valley Area, California*. Summary: Geologic Society of America Bulletin, Part 1, Volume 91, pages 125-129. Document S00301, March 1980.

Lutze, William R. Southern Patrol Division Commander, Inyo County Sheriff's Department, Independence, California. Letter dated May 24, 1993.

MacCallum, B.N. *Mountain Restoration: Soil and Surface Wildlife Habitat.* Geojournal 27(1):23-46, 1992.

Maulchin, L. and A.L. Jones. *Peak Acceleration From Maximum Credible Earthquakes in California (Rock and Stiff Soil Sites).* DMG Open File Report 92-01, 1992.

McGlothin, L.P. Kern County Board of Trade. Personal Communication, May 19, 1993.

Mechtenberg, David A. Administrator, Ridgecrest Community Hospital. Letter dated March 15, 1993.

Mehls, Steven F. and Thomas J. Lennon. *A Class III Cultural Resource Inventory of the Historic Roads, Trails, and Routes of the Briggs Project, Inyo County, California.* Prepared by Western Cultural Resource Management, Inc., Sparks, Nevada, August 16, 1993.

Monastero, Frank. Head of Geothermal Program for the Department of Defense. China Lake Naval Air Weapons Station. Personal Communication, March 15, 1995.

Moore, Jan B. Cultural Resources Short Form Report. On file at the U.S. Bureau of Land Management, Ridgecrest Resource Area Office, Ridgecrest, California, 1981.

Moore, Jan B. Cultural Resources Short Form Report. On file at the U.S. Bureau of Land Management, Ridgecrest Resource Area Office, Ridgecrest, California, 1982.

Moyle, W.R., Jr. *Water Wells and Springs in Panamint, Searles and Knob Valleys, San Bernardino and Inyo Counties, California.* California Department of Water Resources, Bulletin 91-17, 110p, 1969.

Narramore, R. Chief, Ridgecrest Police Department. Personal Communication, September 23, 1993.

National Park Service (NPS). *Statement of Management, Death Valley National Monument, California.* U.S. Department of the Interior, November 1990.

Neath, Bob. Operations Engineer, Kern County Waste Management Department. Personal Communication, September 30, 1993.

Nevada Environmental Consultants, Inc. (NECI). *Draft Biological Evaluation, Mohave Desert Tortoise, Briggs Mine Site Panamint Valley, California*, October 30, 1992.

Oxendine, J. Cultural Resources Short Form Report. On file at the BLM, Ridgecrest Resource Area Office. Ridgecrest, California, 1987.

Oxendine, J. Cultural Resources Short Form Report. On file at the U.S. Bureau of Land Management (BLM), Ridgecrest Resource Area Office. Ridgecrest, California, 1989.

Pacific Gas and Electric (PG&E). Smart Energy Line. Personal Communication, September 15, 1993.

Peterson, R. and C. Freuden. *A Class III Cultural Resource Inventory of the Briggs South Borrow Pit Expansion Project, Inyo County, California*. Prepared by Western Cultural Resource Management, Inc., Sparks, Nevada. 1994.

Racine, ~~Denise~~ Denyse. Personal Communication, February 4, 1994.

Rado, Ted. *Mine Site Inspection in the Panamint Valley, Inyo County, California,* December 17, 1993.

Rado, Ted. *Desert Tortoise Survey Report, Briggs Mine Site, Inyo County, California,* March 1994.

Rand Mining Company. Personal Communication, January 10, 1994.

Reed, R.B. Lieutenant Commander, California Highway Patrol, Mojave Area. Letter dated March 19, 1993.

Reyes, R.A. San Bernardino County Fire Agency. Letter dated March 17, 1993.

Ridgecrest Chamber of Commerce. Population data. Personal Communication, May 20, 1993a.

Ridgecrest Chamber of Commerce. Ridgecrest General Information (as of June 1, 1993), 1993b.

Ridgecrest Community Hospital. Brochure of hospital services, 1993.

Riesen, Dianne. Engineering Assistant, Inyo County Department of Public Works, Independence, California. Letter dated March 17, 1993a.

Riesen, Dianne. Engineering Assistant, Inyo County Department of Public Works. Personal Communication, December 7, 1993b.

Ross, Fred. Kern County Sheriff's Department, Ridgecrest, California. Personal Communication, August 31, 1993.

Rothermel, Ray. Senior Petroleum and Mining Appraisal Engineer, California State Board of Equalization. Personal Communication, September 1, 1993.

Rusco, M., D. Hardesty, S. Mehls and T.J. Lennon. *A Class III Cultural Resource Inventory of the Briggs Project, Inyo County, California*. Prepared for: Canyon Resources Corporation. Western Cultural Resource Management, Inc., October 28, 1992, revised February 25, 1993.

San Bernardino County. Solid Waste Management Department. Personal Communication, September 23, 1993.

Scott, K. Assistant Fire Marshal, Kern County Fire Department. Personal Communication, January 13, 1995.

Seed, H. Bolton. Considerations in the earthquake-resistant design of earth and rockfill dams. *Geotechnique* 29, No. 3, pages 215-263, 1979.

Skinner, M. Botanist, California Native Plant Society, Sacramento, California. Personal Communication with M. Bagley, May 1993.

Slemmons, D.B. *State-of-the-Art for Assessing Earthquake Hazards in the United States, Faults and Earthquake Magnitudes*. NTIS Report 6. Contract DACW39-76-C-0009, 1977.

Smith, B.M. *Map Showing Distribution and Configuration of Basement Rocks in California.* USGS Map OM-215, 1964.

Songer, Don. Sanitation Facility Manager, San Bernardino County Special Districts. Personal Communication, September 17, 1993.

Steward, Julian H. Basin-Plateau Aboriginal Sociopolitical Groups. *Bureau of American Ethnology Bulletin 120.* Smithsonian Institution, University of Utah, 1938. Reprint 1970.

Stoner, E.J. and S.F. Mehls. *A Class III Cultural Resources Inventory of the Briggs Project Expansion, Inyo County, California.* Prepared for Canyon Resources Corporation, Golden, Colorado. Prepared by Western Cultural Resource Management, Inc., Sparks, Nevada. April 14, 1994.

Stribling, Joel. Assistant Sanitation Facilities Manager, San Bernardino County Special Districts. Personal Communication, September 9, 1993.

Thistlethwaite, Chuck. Inyo County. Personal Communication, October 1993.

Tucker, LeRoy. Assistant General Manager, Indian Wells Valley Water District. Letter dated March 11, 1993.

Turner, Brad. Treatment Plant Supervisor, Ridgecrest Department of Public Works. Personal Communication, September 9, 1993.

U.S. Army Corps of Engineers (COE). Letter from David J. Castanon, Chief, North Coast Section, to Conrad Parrish. May 19, 1994.

U.S. Bureau of Land Management (BLM). *Environmental Impact Statement and Proposed Plan, California Desert Conservation Area*, September 1980.

BLM. *Visual Resource Management Program.* Government Printing Office, Washington D.C., 1981.

BLM. *Interim Management Policy and Guidelines for Lands Under Wilderness Review.* Update Document H-8550-1, 1987.

BLM. *Wilderness Study Areas, Surprise Canyon*, CDCA 136. June 1988a.

BLM. *National Environmental Policy Handbook*, H-1790-1. October 25, 1988b.

BLM. *Desert Tortoise Habitat Management on the Public Lands: A Rangewide Plan.* November 1988c.

BLM. *Recommendations for Management of the Desert Tortoise in the California Desert.* 1988d.

BLM. *California Statewide Wilderness Study Report.* Part 4, 1990.

BLM. Personal Communication from Dave Taylor, Ridgecrest Resource Area, October 13, 1993.

BLM. Personal Communication with Tom Zale, El Centro Resource Area, June 15, 1994.

U.S. Environmental Protection Agency (EPA). *Air Quality Criteria for Carbon Monoxide*, October 1979.

EPA. *Air Quality Criteria for Particulate Matter and Sulfur Oxides*, January 1981.

EPA. *Compilation of Air Pollution Emission Factors AP-42*, August 1985.

EPA. *Gold/Silver Heap Leaching and Management Practices That Minimize the Potential for Cyanide Releases*. EPA document 600/2-88-002, January 1988.

U.S. Fish and Wildlife Service (FWS). *Endangered and Threatened Wildlife and Plants; Review of Plant Taxa for Listing as Endangered or Threatened Species; Notice and Review*. Federal Register 50(181):37958-37967. February 21, 1990.

von Welhof, J. Letter to Dennis Hill, BLM Ridgecrest California Resource Area, re: Phillips Trona Project Geothermal Exploration Drill Sites. On file at the U.S. Bureau of Land Management, Ridgecrest Resource Area Office. Ridgecrest, California, 1983.

Walton, K. Caltrans District 9. Personal Communication, December 20 and 21, 1993.

Water Management Consultants, Inc. *Briggs MW-1 and MW-2 Drilling and Installation Details*: Unpublished technical report for the Briggs Project, 1993.

Weaver, Richard A. *Desert Bighorn Sheep in Death Valley National Monument and Adjacent Areas*, March 1972.

Weaver, Richard A. *Impact of the Proposed Briggs Gold Project on Bighorn Sheep and Bighorn Sheep Habitat.* Undated Letter, 1992.

Wesnousky, S.G. *Earthquakes, Quaternary Faults, and Seismic Hazards in California. Journal of Geophysics*. Volume 91, pages 12587-12631, 1986.

WESTEC, Inc. *Feasibility Level Design Report, Briggs Project*: Unpublished technical report, February 1993a.

WESTEC, Inc. *Feasibility Level Design Report for Surface Hydrology and Storm Water Controls, Briggs Project*: Unpublished technical report, March 31, 1993b.

WESTEC, Inc. *Briggs Project Report of Waste Discharge*. Submitted to Lahontan Regional Water Quality Control Board, November 1993c.

Younkin, E. Cultural Resources Short Form Report. On file at the U.S. Bureau of Land Management, Ridgecrest Resource Area Office. Ridgecrest, California, 1984.

Zenis, Wally. A-C Power-ACE Operations. Personal Communication, October 12, 1993.

APPENDIX A
LIST OF PERMITS/APPROVALS REQUIRED FOR PROJECT CONSTRUCTION AND OPERATION

TABLE A.1
FEDERAL PERMIT REQUIREMENTS

PERMITTING AGENCY	REQUIRED PERMITS OR APPROVAL DOCUMENTS	PURPOSE/REQUIREMENTS	APPLICABILITY	DOCUMENTATION
Bureau of Land Management	Plan of Operations	Preparation and approval of a Mining and Reclamation Plan.	Required for developments involving federal land and which represent more than "casual use" of the land.	Detailed documentation in report form.
	Environmental Impact Statement (EIS)	Demonstrate compliance with National Environmental Policy Act (NEPA). Requires environmental baseline studies, evaluation of potential project impacts and the selection of mitigation measures. Also requires review by the public and other agencies.	Required for all developments involving federal land and that represent a potential significant impact or that are likely to be controversial.	Detailed documentation in report form. Draft report is initially prepared for agency and public review. Final report includes sections dealing with responses to comments.
	Demonstration of Section 106[1] Compliance	Section 106 compliance requires survey and inventory of archaeological, historical, and traditional resources in the Area of Potential Effects; significance evaluation of discovered resources relative to the criteria for listing in the National Register of Historic Places (36 Code of Federal Regulations [CFR] Part 60.4); and preparation of treatment (mitigation) plans for resources determined eligible.	Required for projects on federal lands and federally licensed, permitted, or funded projects.	Requires Cultural Resource Use Permit Application. Integrated with EIS requirements by 36 CFR Part 800 regulations. Requires the submission of separate reports to the California State Historic Preservation Officer. Information and application form for a Cultural Resource Use Permit.
Department of Labor, Mine Safety and Health Administration (MSHA)	Notice of Start of Operations	MSHA notification.	Required for mines before the start of mining.	Notification by letter.
	Legal Identity Form	Report on the type of operation, location, and ownership.	Required for mines before the start of mining.	Requires the filing of the application form.
	MSHA Identification Number	Operation is required to obtain a MSHA identification number which is issued at the time the Legal Identity Form is submitted.	Required at the inception of a mine.	Issued by MSHA.
	First Aid Training	Required for all supervisors.	Required for mining operations.	Maintain documentation of certification.
Department of Justice, Bureau of Alcohol, Tobacco and Firearms (BATF)	Explosives Permit	Required for inventory control and use of explosives. To be obtained by contractor supplying explosives.	Any operations involving explosives.	Application for License or Permit of Explosives.
U.S. Army Corps of Engineers	Department of the Army Permit (Clean Water Act Section 404)	Project physical, biological and chemical integrity of United States waters.	Regulates the discharge of dredged or filled materials in waters of the United States, including wetlands and other "special" aquatic sites.	Application form.
U.S. Environmental Protection Agency (EPA)	Notification of Hazardous Waste Activity	Required to manifest shipment of hazardous waste offsite.	For offsite shipment of any hazardous wastes.	Notification of Regulated Waste Activity form. Upon notification, the EPA ID Number is assigned.
Federal Communications Commission (FCC)	Microwave and Radio Licenses	Control broadcasting frequencies and power.	Operation of site radios and microwave communication facilities.	Application form.

92-274 (8/27/94/rb)

[1] Section 106 of the National Historic Preservation Act of 1966.

Denotes Major Permit

TABLE A.2
STATE AND REGIONAL PERMIT REQUIREMENTS

PERMITTING AGENCY	REQUIRED PERMITS OR APPROVAL DOCUMENTS	PURPOSE/REQUIREMENTS	APPLICABILITY	DOCUMENTATION
Lahontan Regional Water Quality Control Board (RWQCB)	Waste Discharge Permit	Protection of surface and ground water quality control and regulation of mine waste management.	Mine waste management units, i.e., waste rock dumps, and heap leach residue piles.	Report of waste discharge, which includes waste management unit design information. RWQCB also reviews and approves construction specifications and as-built drawings.
	National Pollutant Discharge Elimination System (NPDES) Permit	Control of industrial process wastewater discharges. Compliance with Section 402(p) of the Clean Water Act.	Storm water discharges associated with industrial activity which may be contaminated by overburden, raw material, intermediate product, finished product, or waste product.	NPDES Permit Application form.
	Closure and Post-Closure Plan	Long-term protection of surface and ground water quality.	Mine waste management units, i.e., waste rock dumps, and heap leach residue piles.	Site closure and reclamation information, with an emphasis on closure of waste management units. Usually integrated with Report of Waste Discharge.
	Spill Prevention Control and Countermeasures (SPCC) Plan	Protection of surface and ground water quality during mining and processing operations.	The handling of substances onsite that could impact water quality.	SPCC report.
Great Basin Unified Air Pollution Control District (APCD)	Authority to Construct Permit	Preconstruction review of air contaminant emission sources to ensure compliance with federal, state and local air quality regulations. Requires an applicant to identify air pollution source location, expected emissions, potential downwind impacts, and control measures.	Anyone constructing or altering a source of air contaminant emissions.	Requires the performance of APCD New Source Review analyses, including net emissions increase calculation, and air quality impact analysis (dispersion modeling).
	Permit to Operate	Postconstruction review of air contaminant emission sources to ensure compliance with Authority to Construct Permit conditions. Requires verification of compliance with air pollution emissions limitations and monitoring requirements.	Anyone operating a source of air contaminant emissions for which an Authority to Construct Permit has been issued.	Requires the filing of the application form, plus supporting analysis.
California Department of Fish and Game (DFG)	Streambed Alteration Permit	To prevent unmitigated disturbances of streambed habitat. A fee and a copy of the EIR must be submitted prior to processing.	Any substantial physical alteration of any natural body of water.	Notification form.
	Environmental Impact Report (EIR)	Compliance with Endangered Species Act.	Operations affecting fish and game, particularly endangered species.	Integrated with the EIS/EIR.
California Office of Emergency Services, Chemical Emergency Planning and Response Commission	Disclosure Statement	Disclosure of hazardous substances being handled and the location of the operations involving it.	Operations handling extremely hazardous substances.	Notification describing chemicals to be handled and their location.
California Department of Health Services (DHS)	Hazardous Waste Generator Number (same as for EPA)	Allows the state (through the county) to track hazardous waste generation and bill for appropriate fees and taxes if wastes deemed hazardous are produced by the operation.	Hazardous waste generated onsite.	EPA Application form.

92-274 (8/27/94/rb)

Denotes Major Permit

TABLE A.3

COUNTY PERMIT REQUIREMENTS

PERMITTING AGENCY	REQUIRED PERMITS OR APPROVAL DOCUMENTS	PURPOSE/REQUIREMENTS	APPLICABILITY	DOCUMENTATION
Inyo County Planning Department	Environmental Impact Report (EIR)	Demonstrate Compliance with the California Environmental Quality Act (CEQA). Requires environmental baseline studies, a projected impact assessment and mitigation measures. Also requires review by the public and other agencies.	Required for mining operations utilizing cyanide regardless of size.	Documentation is similar to that required for the EIS. The EIS and the EIR can be prepared as a single integrated EIR/EIS document.
	Conditional Use Permit (CUP)	Required for the construction, alteration, or expansion of uses allowed by a Land Use District. Provides the County the opportunity to review the location, design, and manner of development prior to implementation.	Required for the proposed mine when lands become patented.	File a County Plan of Operations which includes a description of the operations, the potential environmental impact, and proposed mitigation measures. These reports have similar requirements to the federal report (Table A.1).
	Mining and Land Reclamation Plan	Compliance with the Surface Mining and Reclamation Act (SMARA).	Mining and exploration projects in California.	Application forms and information describing closure and reclamation activities.
	Demonstration of Compliance with Appendix K of CEQA	Demonstrate compliance with CEQA for cultural resources. Requires environmental baseline studies, field studies, and development of potential migration measures.	Required for land affected by proposed activities on state, or state-licensed or funded projects.	Integrated with EIS/EIR. Requires the submission of a separate technical report to regional archaeological information centers. This technical report is made available to county staff during environmental impact review.
Inyo County Building and Safety Department	Building Plan Approval	Compliance with appropriate codes and standards.	Buildings constructed onsite.	Drawings and specifications.
	Grading Plan Approval	Compliance with appropriate codes and standards.	Construction activity onsite.	Drawing and specifications.
	Building and Occupancy Permits	Fire and Building Safety compliance with appropriate codes and standards.	Buildings constructed onsite.	Requires the filing of an application form.
Inyo County Department of Environmental Health Services	Business and Contingency Plan	Hazardous materials disclosure and contingency plan in case of an emergency.	Businesses that handle, use, generate, or store hazardous material.	Business Plan forms and information.
	Hazardous Waste Generator Number (same as for EPA)	Regulates generators and handlers of hazardous waste.	Hazardous waste generated onsite.	EPA application form.
	Acutely Hazardous Materials Registration Form	Registration of acutely hazardous material use.	Businesses in California which handle acutely hazardous materials in quantities at or exceeding the federal threshold planning quantities for extremely hazardous substances.	Requires the filing of a registration form to the County.
	Water System Permit (water well permit)	To ensure that the potable water supply, storage, and distribution system provides water of adequate quality, and that wells are drilled and constructed in accordance with state requirements.	New water supply facilities.	Application forms, water supply system information, well logs and water quality data.
	Sewage Disposal System Permit	Location, design, percolation rates for septic tanks and underground leach fields.	New septic systems.	Application forms and system design information.

92-274 (8/27/94/rb)

Denotes Major Permit

APPENDIX B
NOTICE OF INTENT, NOTICE OF PREPARATION, INITIAL STUDY, AND COMMENTS

B.1 NOTICE OF INTENT

DEPARTMENT OF THE INTERIOR

Bureau of Land Management

[CA-065-03-4191-03]

Notice of Intent; Proposed Briggs Project Inyo County, California

AGENCY: Bureau of Land Management, Interior.

ACTION: Notice of intent.

SUMMARY: Notice is hereby given that the Bureau of Land Management and County of Inyo will prepare a joint Environmental Impact Statement/ Environmental Impact Report (EIS/EIR) to assess the potential environmental impacts that may be associated with development of the proposed Briggs Project. Public scoping meetings have been scheduled in connection with the preparation of that document.

CR Briggs, a wholly owned subsidiary of Canyon Resources Corporation has filed applications with the Bureau and County for development of an open-pit, heap-leach gold mine in the Panamint Valley on the west flank of the Panamint Range in Inyo County, California. The Briggs Project is located approximately 34 miles northeast of Ridgecrest, California. The project will ultimately affect approximately 450 acres, and includes the following activities: mining, construction and operation of the heap-leach processing facility, construction and maintenance of roads, development of a water well field and pipelines, and reclamation of disturbed lands.

The EIS/EIR will be prepared by the Bureau and County with the assistance of an independent environmental consulting firm selected by the agencies. The following issues have been preliminarily identified for analysis: Water resources, vegetation and wildlife resources (including special interest species), cultural resources, recreation, visual resources, air quality, and public health and safety. In accordance with the National Environmental Policy Act and California Environmental Quality Act requirements, the EIS/EIR will also consider alternatives to the proposed action. Alternatives and additional issues may be identified as a result of the public scoping process.

Two scoping meetings are scheduled for public and agency input to determine the full scope of issues which should be addressed in the EIS/EIR. The dates, times and locations of the public meetings are as follows:

Date and Time: January 12, 1993, 7 p.m.

Location: Ridgecrest, California, Kerr McGee Center, 100 West California, Ridgecrest, CA 93555.

Date and Time: January 13, 1993, 7 p.m.

Location: Lone Pine, California, Statham Hall, 183 Jackson, Lone Pine, CA 93545.

This notice is a request for environmental information that you or your organization feels should be addressed in the EIS/EIR. Detailed information may be included in your response. Written comments should be sent to the address below no later than January 25, 1993.

FOR FURTHER INFORMATION CONTACT: Dave Taylor, Project Manager, Bureau of Land Management, Ridgecrest Resource Area, 300 S. Richmond Rd., Ridgecrest, CA 93555, 619/375-7125.

Dated: December 10, 1992.

Joseph L. Gum,

Acting Area Manager.

[FR Doc. 92-30470 Filed 12-17-92; 8:45 am]

BILLING CODE 4310-40-M

[CO-030-03-5101-10-YCKD; COC51280]

Availability of the Record of Decision for the TransColorado Gas Transmission Project

AGENCY: Bureau of Land Management, Interior.

ACTION: The Bureau of Land Management has prepared the Record of Decision (ROD) for the TransColorado Gas Transmission Project in accordance with the National Environmental Policy Act of 1969, and 40 CFR part 1500. This document is now available to the public.

SUMMARY: The ROD adopts the Agency Preferred Alternative as described in the final Environmental Impact Statement (EIS) and approves issuance of a Right of Way (ROW) grant to TransColorado for the construction, operation, maintenance and eventual termination of a natural gas pipeline and associated facilities. The permanent ROW will be limited to 50 feet in width with an additional temporary work space limited to 25 feet for the majority of the length of the pipeline. In areas where visual concerns were identified the total ROW width will be limited to a maximum of 50 feet. TransColorado will be required to obtain additional temporary use permits (TUP) if Federal lands outside of the authorized ROW are to be disturbed.

The environmental protection measures contained in the EIS will be incorporated into the final Plan of Development (POD). The final POD will be completed and approved prior to issuance of any construction related Notice to Proceed.

The decision is made under the authority of the Mineral Leasing Act of 1920 as amended, the implementing regulations contained in 43 CFR parts 2800 and 2880, and the policy guidance contained in BLM Manual 2800.

The date of publication of this notice in the Federal Register is the start of the 30 day appeal period on the ROD.

FOR FURTHER INFORMATION CONTACT: Interested parties may obtain a copy of the ROD by writing to Chuck Finch, Project Manager, Bureau of Land Management, 2465 South Townsend Avenue, Montrose, Colorado 81401, or by calling Mr. Finch at 303-249-7791.

Dated: December 10, 1992.

Alan L. Kesterke,

District Manager.

[FR Doc. 92-30468 Filed 12-17-92; 8:45 am]

BILLING CODE 4310-JB-M

[OR-013-03-4410-03; G3-071]

Intent to Amend the Warner Lakes Management Framework Plan; Lakeview, OR

AGENCY: Bureau of Land Management, Interior.

ACTION: Opportunity for public comment; notice of intent to amend the Warner Lakes Resource Area Management Framework Plan (MFP), especially for juniper management.

SUMMARY: This notice of intent is to advise the public that the BLM Lakeview District Office intends to amend the existing planning document to address juniper management opportunities.

SUPPLEMENTARY INFORMATION: The BLM is proposing to amend the 1983 Warner Lakes Resource Area MFP to address management of juniper within view of Oregon Highway 140 and in Deep, Camas, Twelvemile and Twentymile Creek Canyons. The plan amendment area covers about 13,500 acres, the majority located in the extreme southern portion of Lake County, Oregon and generally 10-20 miles east and southeast of Lakeview, Oregon. The planning area also includes 400 acres along Twelvemile Creek in Washoe County, Nevada and 10 acres in Modoc County, California that are managed by the Lakeview Resource Area.

The purpose of the amendment would be to identify alternatives which resolve concerns relating to the management of juniper in portions of the Lakeview Resource Area. Preliminary management alternatives identified to

B.2 NOTICE OF PREPARATION/INITIAL STUDY

PLANNING DEPARTMENT
DRAWER L • INDEPENDENCE • CALIFORNIA 93526
OFFICE: (619) 878-2411 *(Ext 2263)*
FAX: (619) 878-2542

County of
INYO

Roger DeHart
Planning Director

NOTICE OF PREPARATION

December 23, 1992

TO: **See Attached Distribution List**

SUBJECT: **Notice of Preparation of a Draft Environmental Impact Statement/ Environmental Impact Report**

Lead Agencies:

Inyo County Planning Department
168 North Edwards Street
Post Office Drawer L
Independence, CA 93526
Contact: Charles Thistlethwaite, AICP

U.S. Bureau of Land Management
Ridgecrest Resource Area
300 South Richmond Road
Ridgecrest, CA 93555
Contact: Dave Taylor

Consulting Firm:

Environmental Solutions, Inc.
21 Technology Drive
Irvine, CA 92718
Contact: David E. Brown

The Inyo County Planning Department and the Bureau of Land Management will be lead agencies and will prepare a joint Environmental Impact Statement/Environmental Impact Report (EIS/EIR) for the project identified below. We need to know the views of your agency as to the scope and content of the environmental information which is germane to your agency's statutory responsibilities in connection with the proposed project. Your agency will need to use the EIS/EIR prepared by our agencies when considering your permit or other approval for the project.

The project description, location, and the potential environmental effects are contained in the attached materials.

Due to time limits mandated by State law, your response must be sent to the above Lead Agencies at the earliest date, but ***not later than 30 days*** after receipt of this notice. We will need the name of a contact person in your agency.

Project Title: Conditional Use Permit No. 92-9 and Mining Reclamation Plan No. 92-3/CR/Briggs, Inc.

Project Location: See attached map.

Project Description: See attached description.

Scoping Meeting Dates:

Tuesday, January 12, 1993 — Ridgecrest, 7:00 p.m., Kerr-McGee Center 100, West California Avenue.

Wednesday January 13, 1993 — Lone Pine, 7:00 p.m., Statham Hall, 183 Jackson Street.

DATE: December 23, 1992

Signature: Roger De Hart

Roger De Hart

Title: Planning Director, County of Inyo

Telephone: (619) 878-0263

Reference: California Code of Regulations, Title 14, (CEQA Guidelines) Sections 152082 (a), 15103, 15375.

CIRCULATION LIST FOR BRIGGS NOP (December 16, 1992)

Julie Bear
Second District Supervisor-Elect
336 First Street
Bishop, CA 93514

Sam Dean
Third District Supervisor
817 South Barlow
Bishop, CA 93514

Keith Bright
Fourth District Supervisor
P.O. Drawer V
Independence, CA 93526

Bob Gracey
Fourth District Supervisor-Elect
P.O. Box 345
Independence, CA 93526

Paul Payne
Fifth District Supervisor
P.O. Box H
Lone Pine, CA 93545

Gerald Atkinson
Inyo County Planning Commission
2316 Loch Lomand
Bishop, CA 93514

Jerry Hollowell
Inyo County Planning Commission
236 Willow Street, Space 3
Bishop, CA 93514

Albert Bent
Inyo County Planning Comission
P. O. Box 1003
Lone Pine, CA 93545

Brent Wallace, County Admin. Officer
County of Inyo
P. O. Drawer N
Independence, CA 93526

Al George, Sheriff
Inyo County Sheriff's Dept.
P.O. Drawer S
Independence, CA 93526

James Gooch, Director
County of Inyo
Public Works/Road Department
P.O. Drawer Q
Independence, CA 93526

Robert Kennedy, Director
Inyo County Env. Health Dept.
P.O. Drawer H
Independence, CA 93526

Rich White, Assessor
Inyo County Assessor's Dept.
P. O. Drawer J
Independence, CA 93526

Paul Bruce, County Counsel
County of Inyo
P. O. Drawer M
Independence, CA 93526

Walter Pachucki, Chairman
Inyo County Mineral and Natural
Resources Committee
P.O. Box 1265
Bishop, CA 93515

Donald Sada, Secretary
Inyo County Mineral and Natural
Resources Committee
2689 Highland Dr.
Bishop, CA 93514

Mary DeDecker
Inyo County Mineral and Natural
Resources Committee
P.O. Box 506
Independence, CA 93526

Frank Monastero
Inyo County Mineral and Natural
Resources Committee
1551 Howell Ave.
Ridgecrest, CA 93555

Ray Gray
Inyo County Mineral and Natural
Resources Committee
373 Mt. Tom Rd.
Bishop, CA 93514

Tim Scott, U.S. Tungsten
Inyo County Mineral and Natural
Resources Committee
Pine Creek Rd. Rt. 2
Bishop, CA 93514

John Wehausen
Inyo County Mineral and Natural
Resources Committee
1417 Bear Creek Dr.
Bishop, CA 93514

State Clearinghouse
Office of Planning and Research
1400 Tenth St., #121
Sacramento, CA 95814

Denyse Racine, Wildlife Biologist
California Department of Fish and Game
407 W. Line Street
Bishop, CA 93514

Ellen Hardebeck
Great Basin A.P.C.D.
157 Short Street, Suite 6
Bishop, CA 93514

Katy Walton, Dist. Trans. Planner
CalTrans District 9 Office
500 S. Main Street
Bishop, CA 93514

Gene Itogawa
State Office of Historic Preservation
P.O. Box 2390
Sacramento, CA 95814

State Geologist
Division of Mines and Geology
801 K Street
Sacramento, CA 95814

Hisam A. Baqai, Supervising Engineer
Lahontan Reg. Water Qual. Cont. Bd.
15428 Civic Drive, Suite 100
Victorville, CA 92392-2359

Lee Delaney, Area Manager
Ridgecrest Resource Area
Bureau of Land Management
300 S. Richmond St.
Ridgecrest, CA 93555

Ed Rothfus, Superintendent
Death Valley National Monument
Death Valley, CA 92328

Ray Bransfield
U.S. Fish & Wildlife Service
2140 Eastman Ave., Suite 100
Ventura, CA 93003

USDA Soil Conservation Serv.
136 Edwards Street
Bishop, CA 93514

Liz Varnhaggen, Regulatory Branch
U.S. Army Corps. of Engineers
Post Office Box 2711
Los Angeles, CA 90053-2325

Valery Pilmer, Acting Planning Director
San Bernardino County Planning
Department
385 N. Arrowhead, 3rd Floor
San Bernardino, CA 92415-4146

Director
Community Development Dept.
City of Ridgecrest
100 W. California Ave.
Ridgecrest, CA 93555-4054

Anthony Magliori, Superintendent
Sierra Sands Unified School District
113 Felspar
Ridgecrest, CA 93555

Jim Copeland, Superintendent
Trona Joint Unified School District
P.O. Box 307
Trona, CA 93592

Lone Pine Chamber of Commerce
104 N. Main Street
P.O. Box 749
Lone Pine, CA 93545

Linus Brewer, President
People for the West
510 Locust St.
Lone Pine, CA 93545

High Desert Multiple Use Coalition
Post Office Box 1167
Ridgecrest, CA 93556

Death Valley 49er's Inc.
534 Cornell Dr.
Burbank, CA 91504

Jim Smith
c/o North American Chemical Corp.
Trona, CA 93562

Gary and Marianne Morgan
419 Arboles Drive
Bishop, CA 93514

Sylvia Colton, President
Eastern Sierra Audubon Society
P.O. Box 1435
Bishop, CA 93515

Mike Prather
Sierra Club, Toiaybe Chapter
P.O. Box 406
Lone Pine, CA 93545

Stan Haye, Chair
Sierra Club Ca.-Nv. Mining Com.
Post Office Drawer W
Independence, CA 93526

PROJECT DESCRIPTION SUMMARY
BRIGGS PROJECT

1.0 INTRODUCTION AND LOCATION

1. CR/Briggs Corporation (Applicant) proposes to develop its Briggs Project in Inyo County, California. The Applicant has submitted a preliminary plan of operations and reclamation for the project to the Bureau of Land Management (Bureau), and submitted a Conditional Use Permit and Mining Reclamation Plan to Inyo County. The issues and concerns identified during public scoping, and subsequent environmental evaluation and preparation of the Environmental Impact Statement/Environmental Impact Report (EIS/EIR) will be used to develop and refine the plans to be sensitive to significant environmental issues.

2. The project is located in Panamint Valley, Inyo County, California, approximately 34 miles northeast of Ridgecrest, as shown on Figure 1. Access from Ridgecrest is via California Highway 178 north 25 miles through Trona, continuing north 2.3 miles on Trona/Wildrose Road, then three miles east over gravel roads to the town of Ballarat, then south seven miles on Wingate Road to the project area.

2.0 FACILITIES AND OPERATIONS

1. Figure 2 shows the location and relative size of project facilities. The project will consist of an open pit mine, waste rock dumps, heap leach facilities, a gold recovery plant and ancillary facilities such as shops, warehouses, offices, etc. The mining pit will ultimately occupy the mouth of Redlands Canyon, at the foot of the Panamint Range. Waste rock dumps will flank the pit. Other facilities will be located on the alluvial fan at the mouth of the canyon. Project activities will disturb 450 acres of land to move about 27 million tons of waste rock and process about 18 million tons of ore. The mine will have the capacity to move up to 45,000 tons per day (tpd) of ore and waste rock. Gold and silver will be leached from the ore by a dilute cyanide solution. The mine pit rim will vary from a high elevation of about 2,190 feet on the east pit wall to low of about 1,360 feet on the west wall. The pit bottom will be at an elevation of approximately 1,125 feet.

2. Prior to operation of the mine, the site will be prepared by removing and storing plant growth media, installing drainage controls, removing unsuitable material from beneath pads, and building and grading the site.

3. Following removal of waste rock to expose the ore, ore would be hauled to a crushing plant. The crusher will be the largest mechanical facility at the project. The plant will include three stages of crushing, conveyors and screens, and appropriate dust control equipment. Crushers will be mounted on permanent concrete foundations. The ore stacking system will consist of a series of fixed and mobile conveyors to deliver ore to the heap leach pad.

4. Leach pad will cover approximated 115 acres and be constructed in phases, with each phase being completed as it is needed. The pad will be constructed on a prepared subbase overlain by a double-liner system. The liner system will consist of an impermeable flexible membrane liner (FML) for the top liner, a wick drain system below this liner, and a clay lower liner (or a second FML).

5. Process water from the heap leaching process will be stored in three ponds. Each pond will be double-lined with a leachate collection and recovery system (LCRS) between the liners. The top liner will be a FML. The LCRS will be a geonet blanket which allows rapid transfer of large amounts of solution. The bottom liner will either be a FML or compacted clay. Floating covers will be installed on active ponds. The LCRS will be designed and constructed to drain any fluids that may leak through the primary liner to a sump. The sump will be fitted with a monitoring port and pump. Process ponds will have sufficient capacity to contain all of the fluid in the system at any one time, plus unexpected onsite flood events.

6. Process facilities to recover gold and silver from the process solution will be installed inside a contained area. The containment system will include either concrete pads with curbs or areas with FML subgrades that lead to the process ponds. Carbon adsorption tanks are the largest components in the process system. They will be located outside and may have a canopy over them. The rest of the process components will be inside the process building.

7. Ancillary facilities will consist of power generators, mine shops and offices, water supply wells, a septic system and leach field, wastewater disposal, and a laboratory.

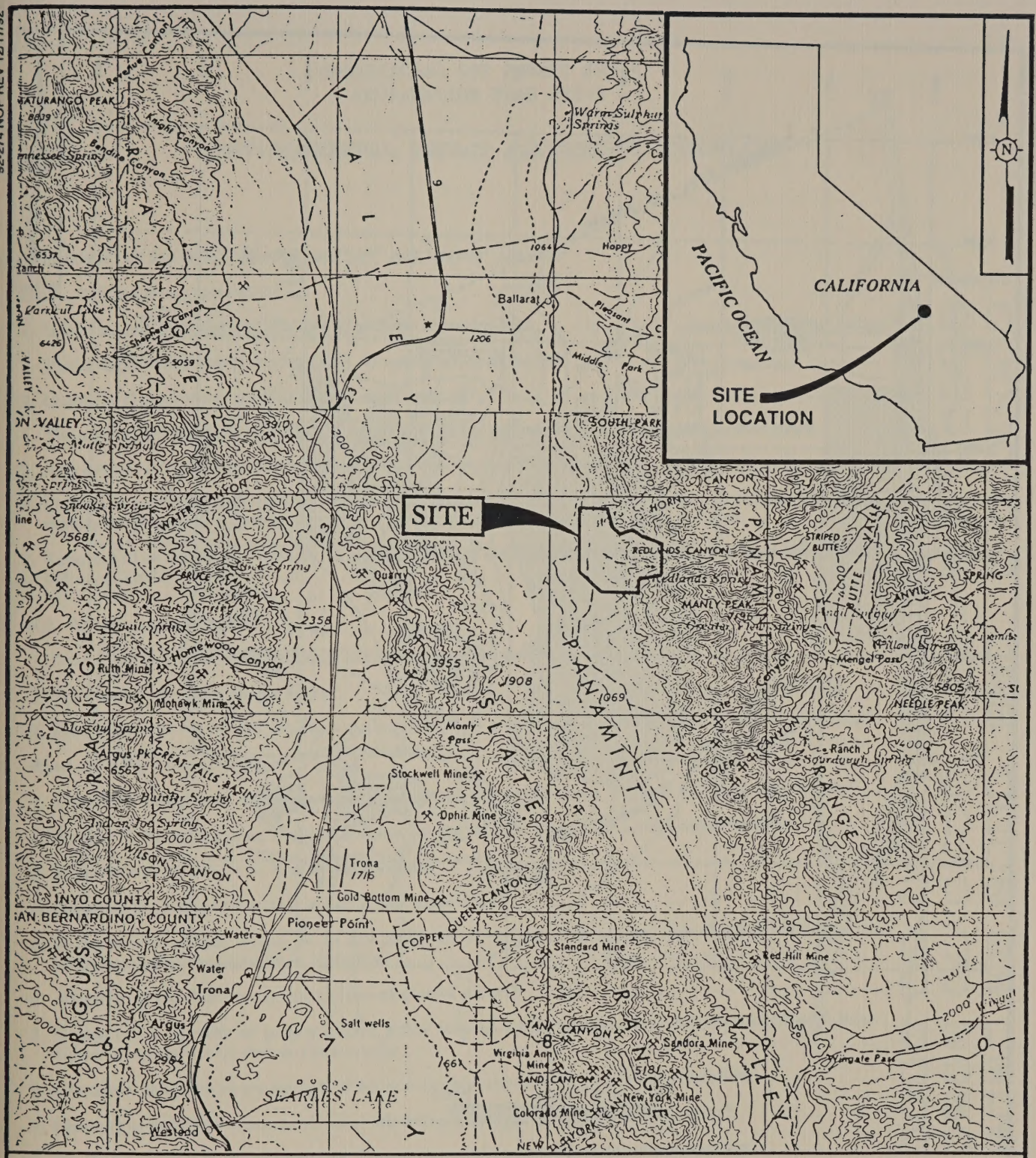
8. Up to 155 people will be employed during the peak construction period and 130 people employed during the operating period. Project construction is expected to begin in early 1994, with gold production beginning later in 1994. The total project life, through reclamation, will be seven to eight years.

3.0 RECLAMATION

1. A detailed post-project reclamation plan for the project will be developed incorporating the results of the environmental review process. The goals of the reclamation plan will be to:
   - Complete reclamation as soon as possible after disturbance.
   - Develop a geomorphically stable post-mining configuration.
   - Provide a post-mining environment that is compatible with surrounding undisturbed areas and capable of sustaining similar land uses.

2. Financial surety will be posted with the Bureau and Inyo County. The surety will provide funds sufficient for project reclamation to be completed, in the event that reclamation is not completed as required. The surety will be released back to the Applicant when the Bureau and Inyo County are satisfied that reclamation is complete.

92-274 NOP REV 12/17/92



0 5 10 MILES

SCALE

CONTOUR INTERVAL: 200 FEET

REFERENCE: U.S.G.S. 1:250,000 TOPOGRAPHIC MAPS OF DEATH VALLEY, CALIFORNIA, DATED 1954 AND PHOTOREVISED 1970, AND TRONA, CALIFORNIA, DATED 1957 AND PHOTOREVISED 1969

FIGURE 1

SITE LOCATION

BRIGGS PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

92-274NOP REV. 12/18/92

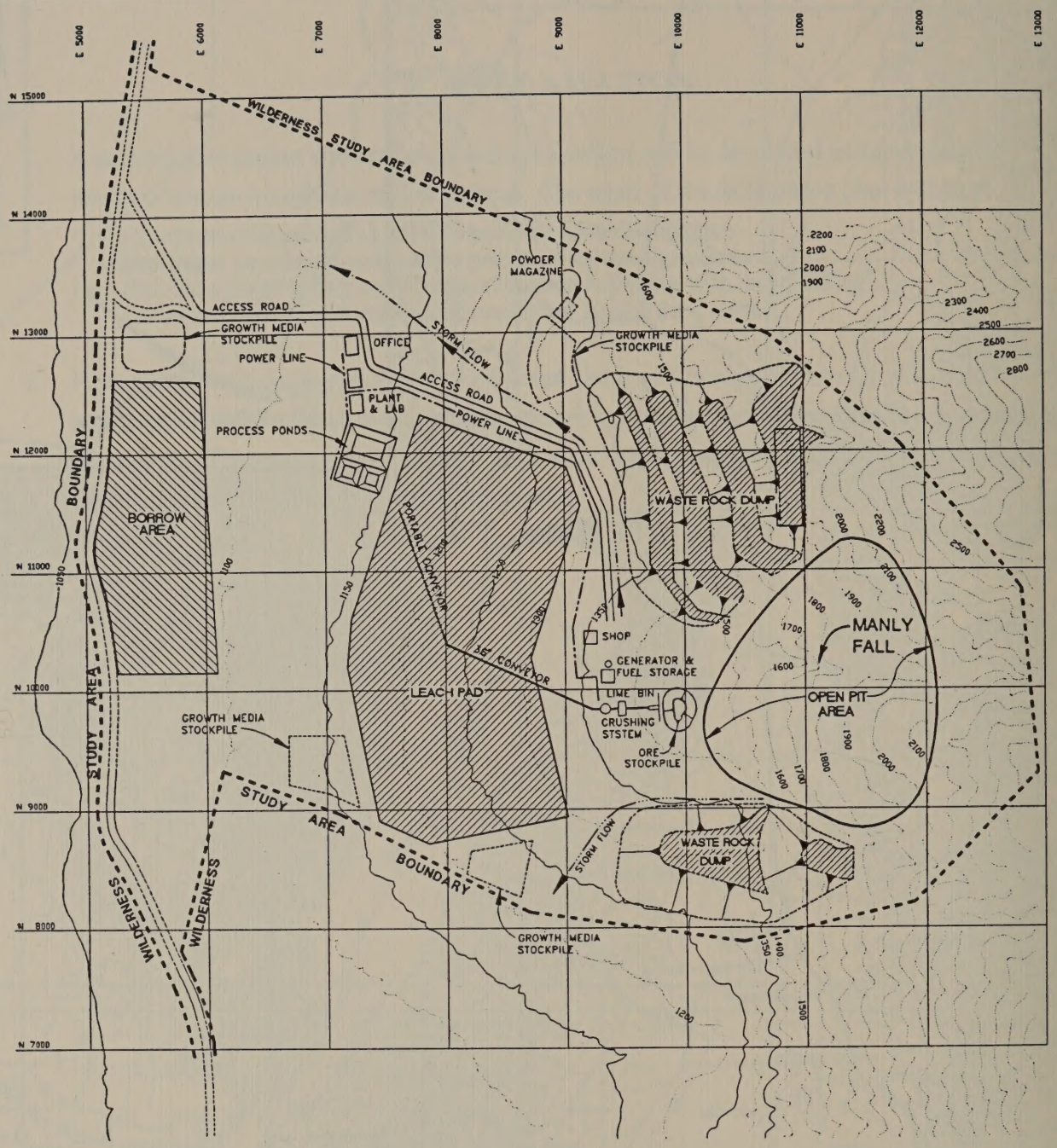


FIGURE 2

PLOT PLAN

BRIGGS PROJECT

SOURCE: CANYON RESOURCES CORPORATION.

ENVIRONMENTAL SOLUTIONS, INC.

CONDITIONAL USE PERMIT #92-9
RECLAMATION PLAN #92-3

ENVIRONMENTAL IMPACT ASSESSMENT CHECKLIST

ENVIRONMENTAL IMPACTS. *(Explain all "yes" and "maybe" answers)*

	Yes	Maybe	No
A. *Earth.* Will the proposal result in:			
1. Unstable earth conditions or changes in geologic substructures?	☐	☒	☐
2. Disruptions, displacements, compaction, or overcovering of the soil?	☒	☐	☐
3. Change in topography or ground surface relief features?	☒	☐	☐
4. The destruction, covering, or modification of any unique geologic or physical features?	☒	☐	☐
5. Any increase in wind or water erosion of soils, either on or off the site?	☐	☒	☐
6. Changes in deposition or erosion of beach sands, or changes in siltation, deposition or erosion which may modify the channel of a river or stream or the bed of the ocean or any bay, inlet, or lake?	☐	☒	☐
7. Exposure of all people or property to geologic hazards such as earthquakes, landslides, mudslides, ground failure, or similar hazards?	☐	☒	☐
B. *Air.* Will the proposal result in:			
1. Substantial air emmissions or deterioration of ambient air quality?	☐	☒	☐
2. The creation of objectionable odors?	☐	☐	☒
3. Alteration of air movement, moisture or temperature, or any change in climate, either locally or regionally?	☐	☐	☒
C. *Water.* Will the proposal result in:			
1. Changes in the currents, or the course or direction of water movements, in either marine or fresh waters?	☒	☐	☐
2. Changes in absorption rates, drainage patterns, or the rate and amount of surface water runoff?	☒	☐	☐
3. Alterations to the course or flow of flood waters?	☒	☐	☐
4. Change in the amount of surface water in any water body?	☐	☐	☒
5. Discharge into surface waters, or in any alteration of surface water quality, including but not limited to temperature, dissolved oxygen or turbidity?	☐	☐	☒
6. Alteration of the direction or rate of flow of ground waters?	☐	☐	☒
7. Change in the quantity of ground waters, either through direct additions or withdrawals, or through interception of an aquifer by cuts or excavations?	☐	☒	☐
8. Substantial reduction in the amount of water otherwise available for public water supplies?	☐	☐	☒
9. Exposure of people or property to water-related hazards such as flooding or tidal waves?	☐	☒	☐
10. Significant changes in the temperature, flow or chemical content of surface thermal springs?	☐	☐	☒
D. *Plant Life.* Will the proposal result in:			
1. Change in the diversity of species, or number of any species of plants (including trees, shrubs, grass, crops, and aquatic plants)?	☐	☒	☐
2. Reduction of the numbers of any unique, rare or endangered species of plants?	☐	☒	☐
3. Introduction of new species of plants into an area, or in a barrier to the normal replenishment of existing species?	☐	☐	☒
4. Reduction in acreage of any agricultural crop?	☐	☐	☒

	Yes	Maybe	No
E. *Animal Life.* Will the proposal result in:			
1. Change in the diversity of species, or numbers of any species of animals (birds, land animals including reptiles, fish and shellfish, benthic organisms, or insects)?	☐	☒	☐
2. Reduction of the numbers of any unique, rare or endangered species of animals?	☐	☒	☐
3. Introduction of new species of animals into an area, or result in a barrier to the migration or movement of animals?	☐	☒	☐
4. Deterioration to existing fish or wildlife habitat?	☒	☐	☐
F. *Noise.* Will the proposal result in:			
1. Increase in existing noise levels?	☒	☐	☐
2. Exposure of people to severe noise levels?	☐	☒	☐
G. *Light and Glare.* Will the proposal result in:			
1. The production of new light or glare?	☐	☒	☐
H. *Land Use.* Will the proposal result in:			
1. A substantial alteration of the present or planned land use of an area?	☐	☐	☒
I. *Natural Resources.* Will the proposal result in:			
1. Increase in the rate of use of any natural resources?	☐	☐	☒
2. Substantial depletion of any nonrenewable resources?	☐	☒	☐
J. *Risk of Upset.* Does the proposal result in:			
1. A risk of an explosion or the release of hazardous substances (including, but not limited to, oil, pesticides, chemicals, or radiation) in the event of an accident or upset conditions?	☐	☒	☐
2. Possible interference with emergency response plan or an emergency evacuation plan?	☐	☐	☒
K. *Population.* Will the proposal result in:			
1. The alteration, distribution, density, or growth rate of the human population of the area?	☐	☒	☐
L. *Housing.* Will the proposal result in:			
1. Affecting existing housing, or create a demand for additional housing?	☐	☒	☐
M. *Transportation/Circulation.* Will the proposal result in:			
1. Generation of substantial additional vehicular movement?	☒	☐	☐
2. Affecting existing parking facilities, or create a demand for new parking?	☒	☐	☐
3. Substantial impact upon existing transportation systems?	☐	☒	☐
4. Alterations to present patterns of circulation or movement of people and/or goods?	☐	☐	☒
5. Alterations to waterborne, rail, or air traffic?	☐	☐	☒
6. Increase in traffic hazards to motor vehicles, bicyclists, or pedestrians?	☐	☒	☐
N. *Public Services.* Will the proposal have an effect upon, or result in a need for new or altered governmental services in any of the following areas:			
1. Fire protection?	☐	☐	☒
2. Police protection?	☐	☐	☒
3. Schools?	☐	☒	☐
4. Parks and other recreational facilities?	☐	☒	☐
5. Maintenance of public facilities, including roads?	☒	☐	☐
6. Other governmental services?	☒	☐	☐

	Yes	Maybe	No
O. *Energy.* Will the proposal result in:			
1. Use of substantial amounts of fuel or energy?	X		
2. Substantial increase in demand upon existing sources of energy, or require the development of new sources?			X
P. *Utilities.* Will the proposal result in a need for new systems, or substantial alterations to the following utilities:			
1. Power or natural gas?	X		
2. Communication systems?		X	
3. Water?	X		
4. Sewer or septic tanks?	X		
5. Storm water drainage?	X		
6. Solid waste and disposal?	X		
Q. *Human Health.* Will the proposal result in:			
1. Creation of any health hazard or potential health hazard (excluding mental health)?		X	
2. Exposure of people to potential health hazards?		X	
R. *Aesthetics.* Will the proposal result in:			
1. The obstruction of any scenic vista or view open to the public, or will the proposal result in the creation of an aesthetically offensive site open to public view?	X		
S. *Recreation.* Will the proposal result in:			
1. An impact upon the quality or quantity of existing recreational opportunities?		X	
T. *Cultural Resources.*			
1. Will the proposal result in the alteration of or the destruction of a prehistoric or historic archeological site?	X		
2. Will the proposal result in adverse physical or aesthetic effects to a prehistoric or historic building, structure, or object?	X		
3. Does the proposal have the potential to cause a physical change which would affect unique ethnic cultural values?		X	
4. Will the proposal restrict existing religious or sacred uses within the potential impact area?		X	
U. *Mandatory Findings of Significance.*			
1. Does the project have the potential to degrade the quality of the environment, reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	X		
2. Does the project have the potential to achieve short-term, to the disadvantage of long-term, environmental goals?		X	
3. Does the project have impacts which are individually limited, but cumulatively considerable?		X	
4. Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?		X	

DISCUSSION OF ENVIRONMENTAL ASSESSMENT
(Explanation of Checklist)

A. *Earth*

1. Excavation of overburden and ore will create a mine pit with a high wall of approximately 1,000 feet (from the bottom); two large waste rock piles weighing approximately 26 million tons situated on steep slopes; and heap leach piles containing approximately 18 million tons. Proper final slope stability will require appropriate analysis, engineering and construction.

2. Displacement, compaction and covering of existing soils will occur from the grading, blasting and earth moving activities. The project is located in an arid environment where soil development is typically poor. A soil survey will be needed to determine the availability and distribution of topsoil primarily for revegetation purposes.

3. Onsite topography will be significantly altered by the project. A plan for final topography will be required to stabilize the mine pit and cover the waste rock piles, heap leach piles, borrow areas and storage ponds.

4. Development of the mine pit will remove or substantially alter the configuration of Manly Falls; a geological feature at the mouth of Redlands Canyon.

5. The project area is located in an area with little vegetative cover. Surface erosion and deposition during precipitation events can, therefore, be high. Removal of vegetation and surface disturbances could increase the rate of soil erosion. Proper drainage control and surface preparation for revegetation will need to be incorporated into plans for project reclamation.

6. Development of the mine pit will modify the current configuration of Redlands Canyon drainage. Changes may occur to the deposition of sediment on the Panamint Valley Playa and the Redlands Canyon alluvial fan.

7. The project is located in a remote and unpopulated area. However, the safety of the public following mine closure is an issue which will be addressed. A known seismic fault exists on and adjacent to the site; appropriate engineering and construction will be required to minimize the potential for hazards such as slope failure.

The EIS/EIR evaluations of soils and geology will focus on:

- Changes to the onsite topography and soils due to mining and processing activities; including Manly Falls.
- Changes to stream configuration and the rate of surface erosion.
- Potential for earth shaking and appropriate engineering for slope stability and safety.

B. ***Air***

1. Earth moving activities, additional traffic on unpaved roads and the use of diesel powered equipment will generate particulate and hydrocarbon and other emissions.

2. Mining and processing activities are not expected to create odors that would be considered objectionable, either onsite or offsite.

3. Mining and processing activities are not expected to alter air movement characteristics or climate.

The EIS/EIR evaluation of air will focus on:

- Ambient levels and project increases in particulates, and the generation of hydrocarbon and other emissions.

C. ***Water***

1. The project site is located in an arid environment with no bodies of surface water.

2. Development of the mine pit will alter the onsite course of ephemeral surface water flow discharging from Redlands Canyon. The onsite pattern of surface drainage will be altered due to the development of project facilities.

3. Development of the mine pit will alter the course of storm flows discharging from Redlands Canyon.

4. The project site is located in an arid environment with no bodies of surface water.

5. Redlands Spring, located 3/4 of a mile to the east of the project site, is the only surface water which occurs in the vicinity of the project.

6. Panamint Valley is a basin of interior drainage. Project withdrawal of ground water is, therefore, not expected to alter its direction or rate of flow.

7. Ground water is located at a depth below that at which mine excavation would occur and, thus, will not be intercepted. Withdrawal of ground water for processing activities will result in localized lowering of the water table.

8. Ground water in this basin of interior drainage is of poor quality (non-potable) and is, therefore, of limited use for other purposes. No public uses of ground water occur in the project vicinity.

9. Stormwater flows discharging from Redlands Canyon may pose a hazard to project employees and facilities. Storm water management will require flow diversions to protect facilities and employees.

10. No surface thermal springs are located in the vicinity of the project site.

The EIS/EIR evaluations of surface and ground water will focus on:

- Changes in the course of ephemeral surface flows.
- Changes in the quantity of ground water.
- Management of potential stormwater flows for the protection of employees and facilities.
- Potential accidental discharges of process reagents or other contaminants that could affect ground water.

D. ***Plant Life***

1. Project activities will remove vegetation from approximately 450 acres. Due to the abundance of similar habitat in the region, the project is not expected to affect the diversity or number of plant species.

2. Surface disturbances and related plant removal may affect special interest plant species.

3. The proposed project does not involve the introduction of plant species. It is intended that reclamation activities use plant species common to the area.

4. No agricultural crops are grown in the vicinity of the project.

The EIS/EIR evaluation of plant life will focus on:

- Changes in the site species and vegetative distribution as a result of surface disturbances.
- The potential for impacts to unique, rare or endangered plant species.

E. ***Animal Life***

1. Project activities will remove vegetation used as wildlife habitat from approximately 450 acres. Due to the abundance of similar habitat in the region, the project is not expected to affect the diversity or numbers of animal species. Exposure of land animals and birds to cyanide or other hazardous material is not expected, but may occur during the life of the project.

2. The site is located at the limits of the known distribution of two special interests species: the desert tortoise, and the Mojave ground squirrel. Wildlife inventories completed for the project indicate that the desert tortoise does not occur at the site. No evidence has been found indicating that the Mojave ground squirrel occurs at the site. Bats, including the lump-nosed bat, occur in mine adits that would be removed during mine pit development. Vegetation removal and related habitat impacts may affect other special interest animal species, including the desert bighorn sheep.

3. The proposed project does not involve the introduction of animal species. Project operations and the construction of facilities may effect the movement of animals across the site.

4. During its life, the project will removed approximately 450 acres of wildlife habitat. Other than the direct surface disturbances associated with mine development and facilities construction, no other deterioration of wildlife habitat is expected.

The EIS/EIR evaluation of animal life will focus on:

- Changes in the onsite habitat and species distribution as a result of surface disturbances.
- The potential for impacts to unique, threatened or endangered species.
- Project operation activities and the potential effects to animals.
- Potential exposure of animals to process reagents, such as cyanide.

F. *Noise*

1. The use of vehicles and heavy equipment, and other activities such as blasting, will increase noise levels during the operational period. As the project is located in a remote, unpopulated area, no significant impact from noise on surrounding lands is expected. The surrounding area is public land that is open to recreational use. The increase in noise levels may adversely impact recreational/wilderness experiences.

2. Employees will be exposed to temporary high levels of noise associated with some activities, such as drilling, blasting and ore/waste removal.

The EIS/EIR evaluations of noise will focus on:

- Exposure of employees to noise.
- The effects of increased levels of noise in relation to recreational uses.

G. *Light and Glare*

1. Mining and processing activities may occur up to 24 hours each day. Lighting of buildings and work areas is planned. This impact will be visible for many miles.

The EIS/EIR evaluations of light and glare will focus on:

- The introduction of new light to an area and its effects on recreational land uses and military aviation.

H. *Land Use*

1. The project site has been used for exploration and mining activities for decades. Local and federal agency land use plans permit mining activities, subject to environmental review and the receipt of appropriate permits. The project would, therefore, not result in a change in the present or planned land use of the site. The proposed use, however would be more intense than past uses.

No detailed EIS/EIR evaluation is necessary as no significant impacts are anticipated.

I. *Natural Resources*

1. Vehicles and equipment for mining and processing activities will use gasoline, diesel fuels, oil and other hydrocarbon products. Construction of facilities may use concrete, wood and other natural resources.

2. Projected use of hydrocarbon products (in excess of 275,000 gallons a month) and building materials is not expected to result in substantial depletion of non-renewable resources.

No detailed EIS/EIR evaluation as no significant impacts are anticipated.

J. *Risk of Upset*

1. Fuels, oils, and process reagents will be stored onsite. Proper storage and handling techniques will be required to minimize the risk of explosion or release of hazardous substances. Cyanide will be stored and utilized in the gold recovery process. Human or animal exposure to cyanide is hazardous. Proper storage, heap leaching, storage pond design and covering will be required.

2. The project is located in a remote, unpopulated area. Facilities and operations would not interfere with any emergency response plan.

The EIS/EIR evaluation of risk of upset will focus on:

- Measures to properly store and handle fuels, oils, cyanide and other hazardous materials.

K. *Population*

1. The project may employ up to 155 people. No employees would live at the project site. However, the new employment opportunities are expected to change the population of the communities of Trona and Ridgecrest.

The EIS/EIR evaluation of population will focus on:

- Population changes in Trona and Ridgecrest as a result of project employment.

L. *Housing*

1. Project employment is expected to change the population in the communities of Trona and Ridgecrest. Housing is expected to be generally available.

The EIS/EIR evaluation of housing will focus on:

- Housing demand in Trona and Ridgecrest as a result of project employment and associated population change.

M. *Transportation/Circulation*

1. Transportation of equipment and supplies, and commuting employees will increase the current levels of traffic on Trona-Wildrose, Ballarat and Wingate County roads. However, project traffic is estimated to be low, at about 100 vehicle trips per day.

2. The project will require onsite parking for employees and equipment. Adequately sized, graded parking areas will be provided.

3. No substantial effects to capacity of existing roads is expected. The types of traffic; commuting employees, heavy equipment, etc., may require offsite improvements to currently unimproved Ballarat and Wingate County roads.

4. Current levels of traffic will be increased as a result of commuting employees and transportation of equipment and supplies. No changes to the existing pattern of circulation is proposed and no road realignments or new offsite roads will be constructed.

5. The proposed project does not involve alterations to waterborne, rail or air traffic.

6. Increased traffic levels on local roads may increase potential hazards to vehicles, bicycles, or pedestrians. However, due to the low levels of current use of these roads, no substantial impact is expected.

The EIS/EIR evaluation of transportation/circulation impacts will focus on:

- Increase in traffic levels on Trona-Wildrose, Ballarat and Wingate County roads.
- The need for offsite traffic improvements as a result of increased traffic on these roads.

N. *Public Services*

1. The project is located at a remote site distant from fire protection services. The operation will maintain fire protection services (i.e., a water truck and fire extinguishers) adequate to service the project.

2. The project site is also distant from Sheriff Department services. It is expected that the operation will incorporate security features and personnel adequate to serve the project.

3. Population growth as a result of project employment may increase the number of students at schools in the communities of Trona and Ridgecrest.

4. Population growth as a result of project employment may have a cumulative impact on the use of parks and recreational facilities in the communities of Trona and Ridgecrest.

5. Increases in traffic on Trona-Wildrose, Ballarat and Wingate roads may increase the level of required County road maintenance.

6. Services provided by Inyo County and other governmental agencies may be affected through provision of planning and engineering, environmental health and other services.

The EIS/EIR evaluation of public services will focus on:

- Population growth and its effects on schools, parks and recreational facilities.
- Road maintenance and other governmental services.

O. *Energy*

1. Vehicles and equipment for mining and processing activities will use gasoline and diesel fuels, oil and other hydrocarbon products. The level of use is expected to be typical of major mining and construction activities. All electrical power will be provided by onsite generators, using approximately 275,000 gallons per month.

2. Fuel supplies are generally available to meet project needs.

No detailed EIS/EIR evaluation is necessary because no significant impacts are expected. However, energy usage and efficiency measures will be identified.

P. *Utilities*

1. Power requirements will be supplied from onsite systems. No public power or gas systems will be affected.

2. Communication will be provided by radio telephone. Extension of telephone lines will not be required.

3. Potable water needs will be met through the use of water purification equipment, or by contracting for delivery. Nonpotable water (process water) will be supplied by an onsite well field. No public water systems will be affected.

4. Project requirements for sewage will be met by the use of onsite septic systems. No public sewage systems will be affected.

5. Project stormwater management will not effect public storm water systems.

6. Solid waste will be hauled to a permitted landfill.

No detailed EIS/EIR evaluation is necessary, because no significant impacts are expected. However, an estimate of the amount of solid waste to be hauled to a landfill will be provided along with an analysis of existing landfill/transfer station capacities.

Q. *Human Health*

1. The project will generate particulate emissions (PM_{10}). Cyanide emissions may also result from heap leaching activities. No substantial potential for the creation of public health hazards is expected due to the remote location of the site. Proper management of cyanide will be required to protect onsite employees.

2. No substantial potential for the creation of public health hazards is expected due to the remote location of the site and proper management of cyanide. Fencing will exclude public access to the site during the operational period.

The EIS/EIR evaluations of human health will focus on:

- Generation and control of particulate emissions.
- Generation and control of cyanide emissions.

R. *Aesthetics*

1. Onsite topography will be significantly altered by the project. Existing slopes and surfaces of the alluvial fan will be topographically altered by the construction of a mine pit, waste rock piles, heap leach pads and other site grading. A plan for final topography will be required.

The EIS/EIR evaluation of aesthetics will focus on:

- Changes to the site's aesthetic characteristics both onsite and from adjacent viewshed points (i.e., Wingate road, Trona-Wildrose road) and wilderness study areas.

S. *Recreation*

1. Use of the site for recreational purposes is limited. Other than roadway traffic, project activities will be limited to the site. The surrounding area is predominantly public land that is open to recreational use. The introduction of project operations will limit public use of the site for the operational period. The project may adversely impact recreation/wilderness experiences in the immediate vicinity.

The EIS/EIR evaluations of recreation will focus on:

- Public access limitations to the site and lower Redlands Canyon during the project operational period.

T. *Cultural Resources*

1. The project site has been inventoried for prehistoric and archaeological resources. Project facilities and operations would not disturb significant sites.

2. No significant prehistoric or historic structures would be affected by the project.

3. No physical change that would affect unique ethnic or cultural values are expected.

4. The project is not expected to restrict religious or sacred uses of the site.

The EIS/EIR evaluations of cultural resources will focus on:

- Potential impacts to prehistoric and archaeological resources.

B.3 COMMENTS ON NOTICE OF PREPARATION

FEDERAL AGENCIES

DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT, CORPS OF ENGINEERS
P.O. BOX 2711
LOS ANGELES, CALIFORNIA 90053-2325

RECEIVED
JAN 11 1993
Inyo Co. Planning Dept.

JAN - 7 1993

REPLY TO
Office of the Chief
Regulatory Branch

	ROGER DEHART	
	CURTIS KELLOGG	
	C. THISTLETHWAITE	
	SANDY [illegible]	
	[illegible]	
	EARL GANN	
	JANET CROSS	
	FILE	

Inyo County Planning Department
Attn: Charles Thistlethwaite
168 North Edwards Street
Post Office Drawer L
Independence, California 93526

Dear Mr. Thistlethwaite:

In regard to your Notice of Preparation of a Draft Environmental Impact Statement/Environmental Impact Report for Conditional Use Permit No. 92-9 and Mining Reclamation Plan No. 92-3/CR/Briggs, Inc. (Briggs Project), Inyo County, California, the Corps has the following comments.

A Corps of Engineers permit, pursuant to Section 404 of the Clean Water Act, is required for the discharge of dredged or fill material into "waters of the United States" including adjacent wetlands. Examples of activities involving the discharge of dredged or fill material include the placing of bank protection, temporary or permanent stock-piling of excavated material, grading roads, any grading (including vegetative clearing operations) involving filling low areas or leveling the land, and construction of weirs, diversions, approach fills or other structures involving the placement of fill material.

For the purpose of the Corps' permit evaluation process, the DEIS/R should include 1) an alternatives analysis identifying the least environmentally damaging practicable alternative, and 2) a review of all public interest factors relevant to the proposal including the cumulative effects thereof.

The proposed Briggs Project appears to impact an unspecified acreage of ephemeral watercourse emanating from Redlands Canyon. The alternatives analysis in the DEIS/R should first examine alternatives which avoid impacts to waters of the U.S. (in this case, the Redlands Canyon drainage). If avoidance is shown to be impracticable in terms of cost, logistics or existing technology in light of overall project purpose, then alternatives which minimize impacts should be considered. Compensatory mitigation may not be used to reduce environmental impacts in the evaluation of the least damaging practicable alternative, but may be required for unavoidable adverse impacts which remain after all appropriate and practicable minimization has been incorporated.

Public interest factors that may be applicable to the Briggs Project include, but are not limited to, conservation, economics, aesthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, flood hazards, floodplain values, land use, water supply and conservation, water quality, energy needs, recreation, safety, mineral needs, considerations of property ownership and, in general, the needs and welfare of the people.

Enclosed you will find a permit application form and a pamphlet that describes our regulatory program. If you have any questions, please contact Diane Noda of my staff at (805) 641-1127. Please refer to this letter in your reply.

Sincerely,

David J. Castanon

David J. Castanon
Chief, Northern Section

Enclosures

United States Department of the Interior

BUREAU OF MINES

WESTERN FIELD OPERATIONS CENTER
EAST 360 3RD AVENUE
SPOKANE, WASHINGTON 99202-1413

January 25, 1993

Memorandum

To: Dave Taylor, Project Manager, Bureau of Land Management, Ridgecrest Resource Area, Ridgecrest, California

From: Chief, Branch of Engineering and Economic Analysis

Subject: Notice of Intent to Prepare a Joint Environmental Impact Statement/ Environmental Impact Report (EIS/EIR) for the Proposed Briggs Project, Inyo County, California

Having reviewed the Preliminary Plan of Operation and Reclamation for the Briggs Project, the U.S. Bureau of Mines is pleased that the economic benefit was included in the document. It allows the opportunity for all parties to visualize the positive aspects of a project.

Though general in nature, the plan provides a good presentation of the company's objective. and appears technically feasible. The following points need to be addressed.

1) Recovery rates, which should already be determined for the economics section, should consider the possibility of carbon trash being present in the heap material that could trap gold from solution and thus reduce recoveries. Also, the presence of metals capable of forming cyanide compounds which would limit effective reclamation should be investigated.

2) Waste rock, although not of ore grade, may contain contaminants. A detailed analysis on the potential for generating acid and hazardous compounds should be completed.

The proximity of the Death Valley National Monument is of minor concern. No adverse impacts to the management are anticipated due to the remote property location.

The adjacent wilderness study area boundary shown in figure 2 of the document appears to have been originally defined by the adjacent road. Because the area is obviously mineralized near the proposed mine, there is every reason to believe that additional resources exist locally. We would support modification of the wilderness study area boundary to develop ore extensions.

This would maximize available mineral resource recovery while minimizing overall mining surface disturbance and allow the mining company access to resources not considered when the original study area was defined.

John R. Norberg

United States Department of the Interior

FISH AND WILDLIFE SERVICE

ECOLOGICAL SERVICES
Ventura Field Office
2140 Eastman Avenue, Suite 100
Ventura, California 93003

March 5, 1993

Memorandum

To: Area Manager, Ridgecrest Resource Area, Bureau of Land Management, Ridgecrest, California

From: Field Supervisor

Subject: Briggs Mine Site, Panamint Mountains, Inyo County, California

The Fish and Wildlife Service (Service) has reviewed your request for concurrence, dated February 16, 1993, that the referenced action would not adversely affect the desert tortoise (Gopherus agassizii), a federally listed threatened species. Your request and our response are made pursuant to regulations promulgated at 50 CFR 402.13.

The proposed mineral exploration and development would occur at the mouth of Redlands Canyon. The proposed open pit mine and heap leach pads would disturb approximately 550 to 640 acres of lands administered by the Bureau of Land Management. Surveys conducted at the site did not detect any desert tortoises or their sign.

Based on the results of the surveys, the Service concurs with your assessment that the proposed action would not adversely affect the desert tortoise. Therefore, formal consultation, as mandated by section 7 of the Endangered Species Act, is not required. Please be aware this memorandum does not authorize the take of desert tortoises in any manner.

If you have any questions, please contact Ray Bransfield of my staff at (805) 644-1766.

United States Department of the Interior

NATIONAL PARK SERVICE
DEATH VALLEY NATIONAL MONUMENT
DEATH VALLEY, CALIFORNIA 92328

IN REPLY REFER TO:

L76 (Briggs Project)

January 27, 1993

Dave Taylor
Bureau of Land Management
Ridgecrest Resource Area
300 S. Richmond Rd.
Ridgecrest, CA 93555

Dear Mr. Taylor:

The National Park Service appreciates the opportunity to participate with you as a Cooperating Agency in the preparation of the EIS for the proposed Briggs Project. Because of the proximity of the proposed project to Death Valley National Monument, some natural resource issues specific to the Monument have been identified by our staff, as follows:

1. Air Quality - Generation of particulate and hydrocarbon emissions that may enter the Monument and affect visibility and vegetation. The cumulative effect should also be addressed. The effect should be addressed on an annual basis, including those periods of the year when temperature inversions limit pollutant dispersal.

2. Vegetation - Hydrocarbon and other gaseous emissions may adversely effect vegetation during temperature inversions.

3. Wildlife - The project may alter the habits and distribution of bighorn sheep and other project-sensitive species. Wide ranging species, such as bighorn, may utilize both the east and west slopes of the Panamint Range. The effects of the project on such species may require field monitoring before and during project. For bighorn this may require animal counts using remote cameras at watering areas and tracking of movements.

4. Noise - Loud and abrupt noises may have an adverse effect on animals and not simply recreationists.

5. Light and Glare - Night lighting will result in significant change in the area and may impact the natural darkness of the southern Panamint/Death Valley areas. Natural darkness is a desired condition in all natural zones in Death Valley National Monument.

When the issue of possible impact to water resources of Panamint

Valley is explored we would appreciate knowing if there is any potential for groundwater pumping in Panamint Valley to have an effect on groundwater or spring discharges in Death Valley. We raise this question because little is known of the hydrologic relationship of these two valleys and the elevation of the floor of Panamint Valley is approximately 1400 feet higher than Death Valley.

Please keep us informed of the EIS preparation schedule and key meetings we should participate in as a Cooperating Agency. The contact for the National Park Service is Jeff Aardahl. He can be reached by telephone at (619) 786-3250.

Sincerely,

Edwin L. Rothfuss
Superintendent

cc: Regional Environmental Officer - WRO

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

March 22, 1993

Dave Taylor
Bureau of Land Management
Ridgecrest Resource Area
300 S. Richmond Road
Ridgecrest, CA 93555

Dear Mr. Taylor:

The Environmental Protection Agency (EPA) has received the notice of intent to prepare an Environmental Impact Statement (EIS) for the **Briggs Project, Inyo County, California.** Our comments are provided pursuant to the National Environmental Policy Act and Council on Environmental Regulations (40 CFR Parts 1500-1508).

The scope of subjects that should be included in the EIS for this gold mine operation is described in the enclosed comments. Topics include water resources, air quality, vegetation and wildlife, and mining waste and reclamation.

We appreciate the opportunity to comment on the proposed project and request four copies of the EIS when it is completed. If you have any questions, please contact me at (415) 744-1584 or have your staff contact Jeanne Dunn Geselbracht at (415) 744-1576.

Sincerely,

Jacqueline Wyland, Chief
Office of Federal Activities

Enclosure

General Comments

Data on the potential adverse impacts of open-pit mining and heap-leach mining and techniques for mitigating these effects have improved in recent years, although uncertainty remains regarding the long-term effects of land disturbance, mining wastes, groundwater withdrawals, and other products of mining activities. We believe that the Environmental Impact Statement (EIS) for the proposed project should build upon this knowledge to demonstrate that all reasonable alternatives to proposed actions have been thoroughly considered and incorporated into the project. The EIS should provide substantial detail on the means of implementing mitigation measures, and should also identify how monitoring will be set up to ensure compliance and assess effectiveness of mitigation.

Water Resources

1. For each alternative the EIS should discuss the project's compliance with state-adopted, EPA-approved water quality standards. The project planning should be fully coordinated with the California Regional Water Quality Control Board-Lahontan Region to ensure that water quality is protected and beneficial uses are maintained. If the project would require discharges to creeks in the area, the EIS should address the potential effects on water quality, such as thermal changes and increased toxicity and salinity. The effects of such impacts on designated beneficial uses of the streams should be thoroughly considered.

2. Completely describe the original (natural) drainage patterns in the project locale, as well as the drainage patterns of the area during project operations and following reclamation. Include hydrologic and topographic maps of the area. This discussion should encompass effects of the project on erosion potential and sedimentation.

a. Identify whether any components of the proposed project would fall within the 100-year (24 hour storm) flood plain. Discuss the potential for flash floods to transport sediment from disturbed areas to stream channels.

b. Discuss the potential for contamination of surface flows (perennial or from storm events) and rainfall which pass may through tailings disposal facilities or waste rock dumps. Describe mitigation measures to prevent this contamination, including construction of run-on/run-off channels, impermeable covers, and any collection or sedimentation ponds. What provisions would be made for post-operation

surveillance to ensure that stabilization of mining waste sites has been effective? Describe the mitigation actions that would be taken should destabilization be detected and identify who would be responsible for these actions.

3. Discuss how accidental releases of hazardous materials, including overflow from ponds would be handled. Identify the potential impacts resulting from failure of components of the solution containment systems and tailings ponds, and the degree to which impacts would be reversible.

4. EPA regards the use, recycling, and final disposition of cyanide in mining as one of the most problematic and controversial aspects of heap leach operations. The behavior of cyanide in soils and groundwater is complex. Discuss the potential for release of cyanide or other contaminants into the soil and groundwater. The EIS should describe how the toxicity of cyanide would be controlled or eliminated during use in processing, and should discuss the environmental fate of cyanides after use in mine processes.

Cyanide may be more persistent in some environments than would be predicted based on general knowledge of attenuation. This may be the result of a reducing environment or cyanide forming complexes with heavy metals. The EIS should describe the predicted chemistry of cyanide in water and soil at the proposed project site, and the cyanide budget resulting from heap leach processing at similar mines. The discussion should identify the composition and toxicity of cyanide compounds present in waste sites such as tailings impoundments; discuss the potential for cyanide compounds to migrate into surface waters and groundwater, and to decompose to free cyanide; and explain any processes used to destroy cyanide.

5. The EIS should enumerate water sources and estimate rates of water use by the proposed project operations as well as current operations and other related projects. Identify any impacts to wetlands, vegetation and wildlife, and other groundwater-dependent resources as a result of groundwater pumping associated with the proposed project. (See "Vegetation and Wildlife," page 3).

6. Discuss the acid generation/neutralization potential for waste rock, tailings, and pit walls at the site. Describe the leach tests to be conducted on ore and waste rock and provide the results for each test. Describe the quality of waters at any mining sites nearby, particularly older mines, that may be used to predict future acid generation at the Briggs site. Describe and commit to measures to prevent acid generation and any

mitigation measures that may be necessary should prevention measures fail.

7. Provide projected chemical characterization of water in open ponds located at the site, including projected water quality in any open pits following closure.

8. Describe in detail the proposed facility design and operation, including liner and cover specifications, ditches and ponds, and maintenance and monitoring activities to insure integrity of facilities throughout project operations and closure.

9. Describe the locations of all monitoring wells, vadose zone monitoring devices (e.g., suction lysimeters), and points of compliance on the site. The screening intervals, parameters to be monitored, and monitoring frequencies should be discussed.

10. Consult with the U.S. Army Corps of Engineers to determine if the proposed project requires a Section 404 permit under the Clean Water Act. Section 404 regulates the discharge of dredged or fill material into waters of the United States, including wetlands and other "special aquatic sites."

If a permit is required, EPA will review the project for compliance with Federal Guidelines for Specification of Disposal Sites for Dredged or Fill Materials (40 CFR 230), promulgated pursuant to Section 404(b)(1) of the Clean Water Act.

Air quality

1. Discuss the attainment status of the area for priority pollutants. Discuss the National Ambient Air Quality Standards (NAAQS) and Prevention of Significant Deterioration (PSD) increments applicable to air quality in the project area. PSD increments exist for sulfur dioxide, total suspended particulates, and oxides of nitrogen. Discuss impacts to the NAAQS and PSD increments from estimated emissions, considering the cumulative effects from all aspects of mine excavation, construction, operation, and support activities, such as vehicle traffic. BLM should closely coordinate with the Great Basin Unified Air Pollution Control District.

2. PSD increments are highly protective of air quality in Class I areas such as wildernesses and national parks. The PSD increments for total suspended particulates are 5 ug/m^3 (annual) and 10 ug/m^3 (24-hour). The EIS should identify any Class I areas within at least 100 kilometers of the project site. Class I areas even further away could potentially be affected as well.

BLM should consult with the National Park Service and the U.S. Forest Service for a determination of which areas could be adversely affected by the proposed action. Potential impacts to Class I PSD areas, including visibility impacts, should be discussed.

3. Discuss any mitigation measures necessary to comply with NAAQS, PSD, and the State Implementation Plan (SIP).

4. Discuss the applicability and requirements of the New Source Performance Standards for Metallic Mineral Processing Plants (40 CFR part 60.380-386) with respect to the proposed project.

5. The EIS should discuss the possibility of an air quality monitoring program which would be implemented to ensure project compliance with all applicable air quality standards and permits.

Vegetation and wildlife

1. Poisoning of animals attracted to waters containing cyanide has been an extremely serious problem with heap leach operations. Discuss the mitigation measures which would be taken to prevent exposure of migratory waterfowl and other wildlife to any toxic waters used in or resulting from processing the ore. Identify how solution impoundments and ditches would be treated to prevent poisonings. Netting and scare tactics are not completely reliable prevention measures. We recommend that serious consideration be given to covering all cyanide solutions on the project site.

2. BLM should work closely with the U.S. Fish and Wildlife Service and the California Department of Fish and Game to determine potential impacts of the project on plant and wildlife species, especially species classified as rare, threatened, endangered, or candidate species on either state or federal lists.

3. The EIS should discuss avoidance, minimization, and mitigation of losses or modification of habitat and plant and animal species composition.

Resource Conservation and Recovery Act

1. The EIS should address whether the "Bevill rulings" to the Resource Conservation and Recovery Act of 1976 (RCRA), as amended, are applicable to any activities or processes at the project site. For the rulings, please refer to the following citations:

o 40 CFR Part 261, Mining Waste Exclusion; Final Rule, Federal Register vol. 54, No. 169, September 1, 1989;

o 40 CFR Parts 260, 261, 262, Mining Waste Exclusion and Definition of Designated Facility; Proposed Rule, Federal Register vol. 54, No. 184, September 25, 1989;

o 40 CFR Parts 260, 261, 262, Mining Waste Exclusion; Section 3010 Notification for Mineral Processing Facilities; Designated Facility Definition; Standards Applicable to Generators of Hazardous Waste; Final Rule, Federal Register vol. 55, No. 15, January 23, 1990.

The EIS should also discuss any measures to be taken at the project site to ensure compliance with applicable RCRA regulations.

Mining Waste Management and Land Reclamation

1. The EIS should discuss the following components of waste management and reclamation plans: (a) a detailed account of measures taken to decommission mine operations, stabilize slopes, and neutralize or cap waste rock, tailings, and leach heaps; (b) identification (including estimated acreages) of the areas targeted for reclamation, and clarification of the intended degree of treatment in each area; (c) estimation of any irrigation requirements; (d) timing of reclamation relative to mining operations and duration of reclamation treatment; (e) standards for determining and means of assuring successful reclamation; and (f) means of assuring that any maintenance required for reclaimed areas would continue after operations cease or while operations are suspended. We recommend that the reclamation plan be coordinated with a site-specific closure plan.

2. The EIS should specify the level of bonding appropriate to the intended scale and quality of reclamation and mining waste management. Also identify who would be responsible for any post-closure cleanup actions should they be necessary.

Special Status Lands

The EIS should discuss the proposed project's potential impacts to the California Desert Conservation Area, any wilderness study areas (WSA), or proposed wilderness areas under S. 21 and H.R. 518 (the California Desert Protection Act). Congress is expected to pass the Act some time this year. If the proposed project is located within a WSA or designated wilderness, BLM must manage the land so as not to impair or

degrade its wilderness values; and the EIS should discuss how this would be accomplished.

Cumulative Impacts

The EIS should address potential cumulative impacts to resources, considering the proposed project in the context of past, current, and reasonably foreseeable future mining and other activities in the project vicinity. The analysis should include a discussion of impacts to water and air quality, hydrology, soils, vegetation, wildlife, and biodiversity.

STATE AGENCIES

STATE OF CALIFORNIA—THE RESOURCES AGENCY PETE WILSON, Governor

DEPARTMENT OF FISH AND GAME
330 GOLDEN SHORE, SUITE 50
LONG BEACH, CA 90802
310) 590-5113

January 22, 1993

Mr. Chuck Thistlethwaite
Inyo County Planning Department
168 North Edwards
Independence, California 93526

Mr. Lee Delaney
Area Manager
Bureau of Land Management
Ridgecrest Resource Area
300 South Richmond
Ridgecrest, California 93555

Gentlemen:

The Bishop office of the Department of Fish and Game (DFG) has reviewed the Notice of Preparation of an Environmental Impact Report/Environmental Impact Statement for the Briggs Project, Conditional Use Permit No. 92/9 Reclamation Plan No. 92-3, SCH 92122070. The proposed project includes an open pit mine, waste rock dump, cyanide heap leach piles, gold recovery plant, and ancillary facilities on a 450-acre site in the Panamint Mountains, Inyo County. In order for the DFG to adequately review the project's impacts to wildlife and botanical resources, the following items must be discussed in the document:

1. A complete assessment of flora and fauna within and adjacent to the project area, with particular emphasis upon identifying endangered, threatened and locally unique species and sensitive and critical habitats.

2. A discussion of direct, indirect, and cumulative impacts expected to adversely affect biological resources, with specific measures to offset such impacts.

3. A discussion of potential adverse impacts from any increased runoff, sedimentation, soil erosion, and/or urban pollutants on streams and watercourses on or near the project site, with mitigation measures proposed to alleviate such impacts. Stream buffer areas and maintenance in their natural condition through non-structural flood control methods should also be considered in order to continue their high value as wildlife corridors.

More generally, there should be discussion of alternatives to not only minimize adverse impacts to wildlife, but to include direct benefit to wildlife and wildlife habitat. Those discussions should consider the Department of Fish and Game's policy that there should be no net loss of wetland acreage or habitat values. We oppose projects which do not provide adequate mitigation for such losses.

Diversion, obstruction of the natural flow, or changes in the bed, channel, or bank of any river, stream, or lake will require notification to the Department of Fish and Game as called for in the Fish and Game Code. Notification should be made after the project is approved by the lead agency.

4. The project site provides habitat for at least one maternity colony of the Townsend's big-eared bat, a California Species of Special Concern and Federal candidate species. Additional spring and summer surveys must be conducted by a qualified wildlife biologist with extensive experience in working with bats. The surveys should include any adits or shafts anticipated to be removed or disturbed in any way by the proposed project. Winter surveys must also be completed to determine if any winter roosts would be impacted by the proposed operation. The document should discuss mitigation measures which the operator is willing to commit to in order to compensate for the loss of the known maternity roost, and any additional roosts located during subsequent surveys. Suggested mitigation measures include gating alternate roost sites which could provide suitable habitat, and conducting a banding project to ensure that the bats displaced by the project actually use the alternate habitat provided.

5. All botanical and wildlife surveys must be conducted during the appropriate time of year, typically spring through summer, in order to detect species which are only visible or active during a limited season of the year. All original biological reports should be included as Appendices to the document, and provided for public review.

6. The document should discuss the amount of water required by the project, and the effect the removal of such water will have on the wetlands located downstream from the project site. These wet areas provide critical seasonal habitat for a variety of wildlife species, such as migratory songbirds, shorebirds, waterfowl, mammals, reptiles, amphibians, and invertebrates.

7. The document should discuss the impacts the proposed project will have on bighorn sheep, mule deer, bobcat, upland game and other species which have traditionally used Redlands Spring as a watering source.

8. The project site is in an area with potential habitat for the Mohave ground squirrel, a State Threatened species, and the desert tortoise, a Federal Endangered species. The document should discuss proposed mitigation for loss of habitat for these species.

9. The document should also discuss in detail the means by which the operator intends to prevent wildlife from coming into contact with process reagents.

10. The document should discuss the cumulative effects of this project combined with other mining operations or developments proposed for the Panamint Mountains.

Thank you for the opportunity to comment on this project. If you have any questions, please call Ms. Denyse Racine, Associate Wildlife Biologist, at (619) 872-1158.

Sincerely,

R. E Mallefo

Fred Worthley
Regional Manager
Region 5

The document should present the biological evidence (Tortoise reports, MGS trapping, etc) to show that these species, or their habitat will be affected. So they [illegible] have. The final EIR/EIS [illegible] of trapping & survey & protocol may or another [illegible] may not have be

cc: Denyse Racine
Bruce Kinney
ESD

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY PETE WILSON, Governor

DEPARTMENT OF TRANSPORTATION
500 SOUTH MAIN STREET
BISHOP, CA 93514

(619) 872-0691

RECEIVED
JAN 25 1993
INYO CO. PLANNING DEPT.

January 21, 1993

File: SBD-178-7.35
SCH: 92122070

Inyo County Planning Department
168 North Edwards Street
Post Office Drawer L
Independence, Ca 93526

Attention: Charles Thistlethwaite

NOP of Draft EIS/EIR Briggs Project

Thank you for the opportunity to review and comment on the Briggs Project in Inyo County. The project is located in Panamint Valley approximately 34 miles northeast of Ridgecrest. Access from Ridgecrest is via Route 178, 25 miles through Trona, then via county roads to the project site.

As a responsible agency Caltrans is concerned with impacts on the transportation system. There is no mention of trucks other than heavy equipment in the materials sent out. The EIS/EIR should address heavy equipment loads, size of trucks, and whether or not there will be any impacts on the State highways.

If you have any questions please call me at (619) 872-0691.

Sincerely,

F. K. WALTON, Chief
Transportation Planning
Branch A

-	ROGER DEHART	-
	CURTIS [illegible]	
✓	C. [illegible]	
	S. [illegible]	
	[illegible]	
	EARL GANN	

cc: SCH: Russ Colliau

STATE OF CALIFORNIA—THE RESOURCES AGENCY PETE WILSON, Governor

DEPARTMENT OF FISH AND GAME
330 Golden Shore, Suite 50
Long Beach, California 90802
(310) 590-5113

November 4, 1993

Mr. Lee Delaney, Area Manager
Bureau of Land Management
Ridgecrest Resource Area
300 So. Richmond Road
Ridgecrest, California 93555

Dear Mr. Delaney:

This letter is intended to follow up on telephone conversations between Ms. Denyse Racine, Department of Fish and Game Wildlife Biologist, Mr. Conrad Parrish, Canyon Resources Corporation, and Ms. JoAnn Hadfield, Environmental Solutions, regarding the Briggs Mining Project in the Panamint Valley.

Due to initial concern that the Briggs Mining Project would impact habitat for the Mohave ground squirrel (MGS), a State threatened species, the project site was trapped twice to determine presence or absence of this species on site. The first trapping effort was conducted in 1989, the third year of a seven-year drought. The second trapping effort was conducted in 1993, after two consecutive years of normal rainfall at the site which produced an average crop of annual vegetation. No MGSs were detected during either survey. The closest known record of the MGS is approximately four miles south of the project site. Since the project site falls approximately two miles north of the recently modified boundary of the MGS and no MGSs have been captured during two trapping surveys, the likelihood that MGSs inhabit the site is quite low. Based on the results of the data collected to date, the Department will not require mitigation for MGS habitat at this site.

If you have any questions, please contact Ms. Denyse Racine at our Bishop field office located at 407 West Line Street, Bishop, California 93514, telephone (619) 872-1158.

Sincerely,

Fred Worthley
Regional Manager
Region 5

cc: Ms. Denyse Racine
Department of Fish and Game
Bishop, California

STATE OF CALIFORNIA—THE RESOURCES AGENCY PETE WILSON, Governor

DEPARTMENT OF CONSERVATION
DIVISION OF ADMINISTRATION
DIVISION OF MINES AND GEOLOGY
DIVISION OF OIL AND GAS
DIVISION OF RECYCLING

801 K Street, MS 24-01
Sacramento, CA 95814-3528
Phone (916) 322-1080
FAX (916) 445-0732
(916) 445-8733

January 20, 1993

Mr. Chuck Thislethwaithe
Inyo County Planning Department
168 North Edwards
Post Office Drawer L
Independence, CA 93526

Dear Mr. Thislethwaite:

Subject: Notice of Preparation (NOP) of a Draft Environmental Impact Report (DEIR) for the Briggs Project Conditional Use Permit No. 92-9 and Reclamation Plan No. 92-3.
SCH #92122070

The Mined-Land Reclamation Project staff of the Department of Conservation's Division of Mines and Geology (DMG) has reviewed the NOP of a DEIR for the Briggs Project Conditional Use Permit No. 92-9 and Reclamation Plan No. 92-3. Also reviewed was the Application for Mining Reclamation Plan, dated November, 1992. The following comments are offered to assist in your review of this project.

The Surface Mining and Reclamation Act of 1975 (SMARA) and the State Mining and Geology Board regulations for surface mining and reclamation practice (California Code of Regulations (CCR), Title 14, Chapter 8, Article 1, Sections 3500 et seq.) and the recently enacted Article 9 Reclamation Standards (enclosed) require that specific items be addressed or included in reclamation plans. Adverse effects from the mining operation and proposed reclamation will be identified and mitigation will be proposed during the environmental review process. For this reason, we recommend that the reclamation plan not be finalized until mitigation is determined, since mitigation measures recommended under CEQA may substantially change the manner in which reclamation is accomplished. The following items were either not included or not sufficiently addressed in the documents we reviewed.

Mining Operation and Closure

- SMARA Section 2772(e) requires that a map of the site clearly show the limits of mining, reclamation, proposed access roads and existing roads on site, and utilities within or adjacent to the mine site.

The maps provided show existing and proposed interim and final contours. They do not, however, depict existing areas of vegetation and proposed areas of revegetation, the locations of erosion control facilities, or the location and entire length of the proposed Redlands Canyon storm flow diversion. We recommend that the maps be revised to illustrate these features.

- CCR Section 3502(b)(2) requires that a reclamation plan address public health and safety, giving consideration to the degree and type of present and probable future public exposure to the site. We recommend that the reclamation plan address this issue. For example, the reclamation plan refers to adits existing on the property, but does not discuss potential access. The plan also states that the abandoned mine pit will "become another...dramatic [topographic] feature...demanding that visitors use the same cautions as are used in other steep slope areas of the Panamint Range. The roads to the pit will be rendered impassable." Rendering roads to the pit impassable may not eliminate safety hazards of the site.

- The reclamation plan refers to the construction of a well field to provide water for processing and fugitive dust control. The location of this field is not indicated on site maps, nor does the plan discuss how this field will be abandoned and reclaimed. Since the design flows for the wells are approximately 750 gallons per minute, the potential impact of ground water pumping on the flows at Redlands Springs should be evaluated and a monitoring plan established to measure and evaluate potential impacts.

Slope Stability and Regrading

- CCR §3502(b)(3) requires that, whenever the final slopes approach the critical gradient for the type of material mined, the regulatory agencies shall require an engineering analysis of the slope stability. The reclamation plan states that the final high wall will have an average gradient of approximately 1 horizontal to 1 vertical (1H:1V) with intermediate slopes of up to 57 degrees, and waste rock slopes will have an average slope of 2.5H:1V with intermediate slopes of 1.5H:1V. The angle of final high wall slope may approach the critical gradient for the rock material, particularly if the orientation of fractures and joints is adverse to the stability of the slope. The intermediate slopes for the waste piles also are approaching the critical gradient for the material. We recommend that the reclamation plan be amended to include an engineering analysis of the stability of the final slopes. This analysis should demonstrate a factor of safety sufficient to ensure long term stability of all final slopes, including

the pit highwalls, waste pile fill slopes, heap leach fill slopes, and final exposed slopes of the solution ponds. We also recommend periodic inspections of the stability of the quarry highwalls and fill slopes. If the slopes show evidence of mass instability, additional engineering analysis of the slope stability should be performed to assess mitigation measures and the appropriate measures should be implemented. The stability analysis should demonstrate that the final slopes will have a factor of safety sufficient to ensure long term stability.

Erosion Control and Diversion Structures

- CCR §3502(a)(3) and §3706(a)-(g) require that erosion control facilities such as retarding basins, ditches, streambank stabilization, and diking be constructed and maintained where necessary to control erosion. The reclamation plan states that a diversion structure will be constructed to divert storm water flows in Redland Canyon around the mine pit. However, no details are provided on the location, type, or size of this diversion structure. Since the mine pit will be located at the mouth of Redlands Canyon, diversion of surface flows around the top of the highwall, as shown on the reclamation maps, appear to require construction of a diversion structure a significant distance up the canyon, possibly within the wilderness study area. We recommend that the reclamation plan be amended to include engineering details, assumptions, and specifications for the diversion structure, and other drainage ditches required around stockpiles, waste dumps, and heap leach pads. An erosion control plan should be provided in the reclamation plan to identify and provide standard erosion control procedures and specifications. This erosion control plan should also address long term maintenance requirements for the Redlands Canyon diversion structure and any other sizeable permanent structure.

Environmental Setting and Protection of Fish and Wildlife Habitat

CCR Section 3502(b)(1) requires that the reclamation plan include a description of the environmental setting of the mined site, and Section 3503(c) requires that all reasonable measures be taken to protect fish and wildlife habitat. A thorough documentation of the biotic setting is necessary for the following reasons: 1) to provide an accurate documentation of baseline conditions, 2) to aid in the development and evaluation of an appropriate revegetation plan, and 3) to evaluate mining and reclamation impacts on wildlife habitat. We recommend that all biological studies completed to date and any additional studies be included in the reclamation plan. Specific areas in which additional information is needed are as follow.

- We recommend that a description of the vegetation with discussion of density, cover, and composition be included in the plan. This information will form the basis for site revegetation and will also be applicable to a discussion of wildlife utilization of the site.

- The project area is within the range of several sensitive species. California Department of Fish and Game, Natural Diversity Data records place the following species on the Manly Fall quadrangle on which the project is located and on the adjacent Ballarat quadrangle.

Nelson's bighorn sheep	Ovis canadensis nelsoni
State: California Fully Protected Species	
BLM: Sensitive	
Mohave ground squirrel	Spermophilus mohavensis
State: Threatened	
Prairie falcon	Falco mexicanus
State: Species of Special Concern	
Pale big-eared bat	Plecotus townsendii pallescens
State: Species of Special Concern	
Panamint alligator lizard	Gerrhonotus panamininus
State: Species of Special Concern	
Panamint daisy	Enceliopsis covillei
CNPS: List 1B	
Panamint Mountains lupine	Lupinus magnificus var. magnificus

In addition to these species, the project is also within the range of the following Species of Special Concern:

Spotted bat	Euderma maculatum
Pallid bat	Antrozous pallidus
Northern harrier*	Circus cyaneus
Sharp-shinned hawk*	Accipiter striatus
Cooper's hawk	Accipiter cooperii
Ferruginous hawk*	Buteo regalis
Golden eagle**	Aquila chrysaetos
Burrowing owl	Athene cunicularia
Le Conte's thrasher	Toxostoma lecontei

* Winter range
** California Fully Protected

The project is also within the range of the desert tortoise (Gopherus agassizi). Population density of the desert tortoise in the eastern Mojave Desert is far less than that of the western Mojave Desert. We recommend that the baseline wildlife and floristic surveys be supplemented with surveys conducted during the appropriate seasons and that they conform to the guidelines of the appropriate regulatory agencies.

Under CEQA Section 15380(d), California Species of Special Concern and California Native Plant Society List 1 and List 2 plants meet the criteria for state listing and are considered to have the same protection as a listed species. Consultation with the California Department of Fish and Game and U.S. Fish and Wildlife Service would be required in the event the presence of sensitive species on site.

- The project is located adjacent to Redlands Spring at the mouth of Redlands Canyon. The spring is perennial and would have significant wildlife habitat value. The plan states that by avoiding impacts to the spring, any "significant disruption" of the bighorn sheep use of the spring would be avoided. We recommend that the reclamation plan assess any potential effects of developing a ground water well field on the flows of Redlands Spring and provide a monitoring program to measure and evaluate any impacts. We also recommend that the potential effects of disturbances, such as blasting and heavy equipment operation, on wildlife utilization of the spring be assessed.

NOT IN REC PLAN

- The reclamation plan states that "lump-nosed bats" are found in the old mine adits on the site. Is this reference to the California leaf-nosed bat? There is no bat taxon whose common name is lump-nosed bat. Removal of sensitive species of bats from any adits would require coordination with the California Department of Fish and Game. Any gates or closure of the adits should provide for continued access for the bats.

- The reclamation plan should provide for reclamation of wildlife habitat having at least the same quality as the existing baseline habitat. Since sensitive species are found on site, we recommend that provisions for habitat conservation (e.g., wildlife corridors, vegetation continuity, etc.) be included in the reclamation plan.

- Ponds and leach pads associated with cyanide leaching are attractive to wildlife. The reclamation plan should describe provisions for preventing access to the ponds by wildlife.

Resoiling and Revegetation

- The reclamation plan states that "it is expected that there will be a shortage of plant growth media available." The plan then proposes to prioritize areas for revegetation, using the growth media in these areas. We recommend that the reclamation plan calculate the amount of "topsoil" or growth medium available on the site and develop a comprehensive plan to conserve this valuable resource.

If an adequate amount of soil is not available to spread over the entire site to be reclaimed, we recommend that soil pockets or soil islands be developed as revegetation sites. In this manner, revegetation will have a greater potential to succeed over the entire site.

- We recommend that the reclamation plan discuss how the topsoil will be conserved and protected from wind and water erosion. Topsoil stockpiles shown on the site maps are in the path of the diverted storm flows. Another important consideration is the preservation of soil microorganisms in the topsoil stockpiles. We recommend that this aspect of topsoil storage be addressed in the reclamation plan.

- CCR Section 3503(g) requires that revegetation be appropriate for the setting of the site, and that available research be used to address revegetation methods and the selection of species for the site. The reclamation plan provides a brief description of the proposed interim and final revegetation of the project site. The revegetation species list includes a number of non-native species and the plan proposes to use commercial seed. Because information on the vegetation of the site is not included in the reclamation plan, it is not clear if any of the native species on the revegetation list actually occur on site. If these native species are not indigenous to the project area, we do not recommend their inclusion in the revegetation mix. Although non-native species may be established in the desert, the use of native species will ultimately result in the most successful revegetation efforts. An assessment of wildlife utilization of the site will also be necessary in developing a revegetation mix. The vegetation to be established should closely mimic existing vegetation and provide the appropriate structure, diversity, and foraging opportunities to support species found on site.

We recommend that a formal revegetation plan be included in the reclamation plan. In order to develop revegetation criteria, we recommend that the revegetation test trials be developed to include the following items:

- Test the majority of native plants found on site. The revegetation species list should be based on native species indigenous to the site. Rooted cuttings, divisions, or seeds of plants from the project area would be adapted to the site-specific conditions in that area and would, therefore, have a greater likelihood of successful establishment. Use of indigenous native species will also preserve the genetic integrity of the site vegetation. We recommend that the final species list consist of a mixture of native climax and early-successional species. If commercial seed is used, the source should be from the immediate vicinity of the mine.

- Assess native microbial symbionts. We recommend that tests be undertaken to develop methods for introducing and conserving soil microbial symbionts. Indigenous native species should also be tested on several different soil regimes, including those incorporating native soil at the root zone.

- Assess the need for fertilization. The plan proposes to use fertilizer to enhance soil fertility. The use of fertilizer in many ecosystems is not recommended for several reasons: 1) fertilizer may increase growth, promoting more rapid depletion of soil moisture, 2) fertilizer may promote shoot rather than root growth, and 3) nitrogen and phosphorus depress microbial symbionts, preventing inoculation from occurring. Microbial symbionts enable the plants to fix nitrogen, enhance phosphorus uptake, and also improve root characteristics. Because the symbionts are present in native soils, incorporation of soil from native stands of vegetation into disturbed soils or top-dressing with native soils can provide the symbionts necessary for plant growth, thus eliminating the need for intensive fertilization.

- Alternate seed application techniques. Tests of seeding methods other than broadcast seeding and hydroseeding are recommended because hydroseeding is not usually successful in arid climates. Seeds left on the soil surface are subject to desiccation and predation by rodents.

- Species interactions. We recommend that revegetation tests also assess species interactions for example, nurse plant effects, the results of growing nitrogen-fixing species grown with other species, and allelopathy.

- Exotic species control. The revegetation plan should address this issue if it relates to the project area.

- Remedial actions. The reclamation plan should clearly state what remedial actions will be undertaken if revegetation does not meet the performance criteria established.

- SMARA Section 2773(a) requires that the reclamation plan establish "site-specific criteria for evaluating compliance with the approved reclamation plan, including topography, revegetation, and sediment and erosion control." We recommend that the reclamation plan establish criteria for evaluating compliance with the approved reclamation plan.

  We recommend that the reclamation plan include specific quantitative performance standards. The standards should be based upon the type of vegetation to be established and incorporate 80 percent confidence limits, at a minimum. Performance standards should also be set for species diversity to be attained at the end of a specific time period.

We recommend that a vegetation monitoring program be developed prior to plan approval and that monitoring continue until performance standards are met. Due to the slow rate of revegetation in arid climates, we recommend monitoring on an annual basis and that it continue for at least ten years following implementation. The proposed two year time period in which to complete site reclamation is not adequate. Annual revegetation progress reports should be submitted to the lead agency and DMG.

- The reclamation plan states that revegetation costs would be approximately $225.00 per acre. Successful revegetation of arid lands will probably cost considerably more. We recommend that the amount of financial assurances for revegetation be finalized after a formal revegetation plan is developed.

If you have any questions on these comments or require any assistance with other mine reclamation issues, please contact James S. Pompy, Mined-Land Reclamation Project manager at (916) 323-8565.

Sincerely,

Deborah L. Herrmann

Deborah L. Herrmann
Environmental Program Coordinator

Enclosures

LOCAL AGENCIES

ROBERT L. KENNEDY, R.E.H.S.
Director, Environmental Health

TEL (619) 878-2411
FAX (619) 872-2712

COUNTY OF INYO

ENVIRONMENTAL HEALTH SERVICES
P.O. Box 427
INDEPENDENCE, CALIFORNIA 93526

January 18, 1993

Mr. Chuck Thistlethwaite, AICP
Inyo County Planning Department
P.O. Drawer "L"
Independence, CA 93526

RE: RESPONSE TO BRIGGS NOP, CUP 92-9/MINING RECLAMATION PLAN 92-3

Dear Mr. Thistlethwaite;

Attached is the response of the Department of Environmental Health Services to the Project Description Summary for the Briggs Project NOP. The response addresses the following issues of concern: Water, sewage disposal, solid waste management, hazardous materials, and hazardous wastes.

I. Water

During both construction and operational phases, the usage (at least 25 persons at least 6 months of the year) will categorize the water system as a Non-Transient, Non-Community Water System. CR/Briggs Corporation would become a water purveyor and, under the California Safe Drinking Water Act, the water system would be regulated by the Inyo County Department of Environmental Health Services. An annual water supply permit is required, and as a contingency of permit issuance, a number of requirements pertaining to design and construction and monitoring will also have to be met:

1) Source design (well log + seal depth, yield as determined by 72 hour sustained pumping, etc.)

2) Storage, if applicable (tank design, non-toxic water contact surfaces, adequacy of size, sanitary considerations, etc.)

3) Distribution system (sizing and materials of construction for piping, valving, and appurtenances, cross-connection controls, etc.)

4) Monitoring by a State-Approved Water Testing Laboratory for the following parameters and frequencies:

a) Bacteriological - monthly (can be contracted with ICEHS)

b) General mineral, nitrates, fluoride - one time

c) Organics - once every 3 years

Additionally, systems with groundwater sources are subject to additional analyses for nitrate, inorganic, or additional non-monitored organics if the Department has reason to suspect the presence of any of these chemical constituents. In the project area, high levels of arsenic, fluoride, or radioactivity would not be considered uncommon. Monitoring for cyanide may also be considered.

Importation of water from an off-site source is to be discouraged. All of the previously mentioned requirements would apply as well as additional requirements relating to the transport of water to the project site (dedicated tankers for water, etc.)

II. Sewage Disposal

The project proposes to provide sewage disposal with on-site septic systems. The suitability for septic tank-leach field installations is predicated upon conditions of acceptable soil types, permeabilities, etc. These conditions are discussed in detail in the Inyo County Wastewater Policy (copy enclosed).

With little or no knowledge of the environmental conditions at this site, it is not possible to comment on the suitability of this site for septic systems. However, with the very high percentage of cobbles and boulders apparent on the ground surface, it is probable that leach fields will be required to be proportionately oversized or that alternative disposal system designs may have to be considered (Example; importation of fill for leachline installation).

III. Solid Waste

First, a study should be prepared to determine the type of solid wastes to be created and volumes. Determination should be made as to whether the waste stream will be consistent from construction through operations or if it will vary.

Any solid wastes created during the construction of the facility can not be disposed of at the local transfer station. Depending on the volume, it is questionable as to whether the material may be disposed of at the Lone Pine Landfill. Inyo County Integrated Waste should be contacted to determine if Inyo County could receive this waste. If the determination is made that a solid waste company from Ridgecrest will be handling the waste, Kern County and or the City of Ridgecrest should comment on whether the Ridgecrest Landfill can handle the material.

The volume of the waste stream during operations will determine if the waste can be disposed of at the Homewood Canyon Transfer Station. This determination must be made by Inyo County Integrated Waste. If waste is hauled directly to Ridgecrest, the Kern County and/or City of Ridgecrest must be contacted for comment. There is a small landfill in Trona which is in San Bernardino County. This site may be another alternative for disposal.

Waste rock from mining operations is defined as a solid waste. If the mine tailings are regulated by the Regional Water Quality Control Board, the Department of Environmental Health as the local enforcement agency for solid waste will not regulate the facility as a solid waste disposal site.

IV. Hazardous Materials

Due to the use of large quantities of cyanide, the operators are required to file an "Acutely Hazardous Materials Registration" form to the Department of Environmental Health. Based upon the information provided regarding the site, the Department will then determine if a "Risk Management Prevention Program" will be required. The determination to require a RMPP is based upon the risk of an acutely hazardous material accident and its' potential impact on public health and safety or the environment.

Due to the quantities of hazardous materials being proposed to be stored on site, the facility must submit and have an approved Hazardous Materials Business Plan prior to the start of operation, by the Department of Environmental Health Services.

V. Hazardous Waste

The generation of hazardous wastes must be addressed.

All quantities of hazardous wastes generated in California are regulated.

If hazardous wastes are generated at the site, the facility must obtain an EPA identification number, and depending upon the type of hazardous waste generated, a DTSC permit may be required.

If you have any questions regarding any of these issues, please contact me at 873-7865 at your convenience.

Sincerely yours,

Robert L. Kennedy, Director
Environmental Health Services

by: Bob Hurd
Robert L. Hurd, Supervisor

RLK/RLH/kar

Enclosure: Wastewater Policy

cc: Dave Taylor, U.S. Bureau of Land Management
✓David E. Brown, Environmental Solutions, Inc.
Cheryl Hawkins, Inyo County Environmental Health Services
Mark Von Seggern, Inyo County Environmental Health Services
Tom Rheiner, Lahontal Regional Water Quality Control Board
Dale Hoverman, Dept. of Health Services, Toxic Substances Control Branch
Jeff Stone, Dept. of Health Services, Office of Drinking Water

sd93.1/briggs.nop

Attachment not included - on file at County.

CITY OF RIDGECREST

January 7, 1993

Charles Thistlethwaite, AICP
Inyo County Planning Department
168 North Edwards Street
Independence, CA 93526

Subject: Notice of Preparation of a Draft Environmental Impact Statement/Environmental Impact Report for CUP No. 92-9 and Mining Reclamation Plan No. 92-3

The City of Ridgecrest thanks you for this opportunity to comment on the proposed Briggs, Inc., mine to be located in the Panamint Valley. We would like to offer the following comments regarding issues we believe should be addressed by the EIR/EIS:

Transportation/Circulation: The Cal-Trans Park & Ride located on Highway SR178 within the City limits should be expanded to accommodate the additional parking generated by this proposal. This lot is currently in a state of overflow, with patrons parking in unimproved areas.

Housing: The City of Ridgecrest Community Development Department (619-371-37-21) will be glad to assist you in determining housing stock availability figures for the community.

Animal Life: The City of Ridgecrest is located within the Eastern Sierra Flyway for migratory water fowl, and as such we are supportive of requirements for screening the ponds to protect the birds from process reagents.

Air Quality: The Panamint Valley is in the Southeast Desert Air Basin and the Searles Valley Planning Area which are rated as "moderate" for nonattainment to ozone CAAQS and moderate for nonattainment of PM_{10} standards. The City is supportive of appropriate mitigation measures for these conditions.

100 WEST CALIFORNIA AVENUE • RIDGECREST, CALIFORNIA 93555-4054 • PHONE (619) 371-3700

Aesthetics: The City serves as one of the major gateways to Death Valley and is concerned about maintaining scenic viewscapes. Understanding the demand for natural resources, the City would be supportive of measures to restrict blasting to times of darkness.

The City of Ridgecrest is supportive of multiple uses of the natural resources of the Mojave Desert in a wise and thoughtful manner. We are assured that Inyo County and the Bureau of Land Management will provide adequate precautions for this project. We thank-you for this opportunity to comment and would appreciate a copy of the EIR/EIS for review when complete.

Respectfully yours,

Gina-Marie Robinson
Planner, City of Ridgecrest

CC: Bureau of Land Management, Dave Taylor
Environmental Solutions, Inc, David E. Brown

BUSINESS/ORGANIZATIONS

TO: Distribution

February 3, 1993

FROM: David Taylor

SUBJECT: Comment's on EIS/EIR

On January 28, 1993, I received a verbal comment over the phone from Mr. Steve Hartman, a representative of California Native Plant Society and a member of the District Advisory Council (BLM). His comment is concerning impacts caused by non-native (invader) plant species.

DT:rm

Distribution: Chuck Thistlethwaite
Conrad Parrish
Dave Brown

Defenders
OF WILDLIFE

January 21, 1993

Dave Taylor
Bureau of Land Management
Ridgecrest Resource Area
300 South Richmond Road
Ridgecrest, CA

Re: Scoping input for preparation of the proposed Briggs Project Environmental Impact Statement/Environmental Impact Report (EIS/EIR)

Dear Mr. Taylor:

Defenders of Wildlife submits this letter and accompanying materials as our comments and recommendations with respect to scoping for the proposed Briggs Project EIS/EIR. Please consider our input, and include this letter and accompanying materials in the appropriate administrative record.

At the outset, we are greatly concerned at the overall acceleration in the fragmentation and isolation of habitats. Proposed projects which increase habitat fragmentation and/or disrupt necessary wildlife movement patterns may cause much more egregious impacts than projects only having localized impacts or occurring in already fragmented habitats. In this context, the proposed Briggs Project is located in a relatively pristine region at the foot of the Panamint Range. A project of this potential magnitude could have serious ramifications on a regional basis, including with respect to changing or disrupting wildlife movement patterns as well as causing stress to sensitive species.

We believe that the preliminary list of environmental issues should be expanded to include potential habitat fragmentation impacts, along with the need to consider the effects of this proposed project vis-a-vis landscape ecology and conservation biology principles. Similarly, we were concerned that the references on the preliminary list of environmental issues for noise, light and glare, and water did not include an indication that these changes may harm species. For example, changes in surface water availability could dramatically affect many wildlife species. In addition, some species may be vulnerable to increased noise and/or light and glare levels.

CALIFORNIA OFFICE: 1228 N ST., SUITE #6, SACRAMENTO, CA 95814 • (916) 442-6386 • FAX: (916) 442-6389
NATIONAL OFFICE: 1244 NINETEENTH ST., NW • WASHINGTON, DC 20036 • (202) 659-9510 • FAX: (202) 833-3349

Printed on recycled paper

Defenders
OF WILDLIFE

Enclosed are some materials which you may find of interest. In particular, please note the information describing habitat fragmentation problems and the urgent need to integrate landscape ecology and conservation biology principles into ongoing programs, including environmental review such as the preparation of your EIS/EIR.

Thank you very much for considering our input.

Sincerely,

Richard Spotts
California Representative
Defenders of Wildlife

Enclosures



High Desert Multiple-Use Coalition

USDI Bureau of Land Management
Ridgecrest Resource Area
300 S. Richmond Rd.
Ridgecrest, CA. 93555
Attn: Dave Taylor

January 25, 1993

RE: COMMENTS REGARDING DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR CANYON RESOURCES BRIGGS PROJECT INYO COUNTY, CALIFORNIA

On behalf of the High Desert Multiple-Use Coalition, Inc. (HDMUC), please accept the following comments regarding the Briggs Project.

1. The handouts provided at the January 12, 1993 Public Scoping Meeting seemed to focus only on a large number of negative aspects related to this project. The range of environmental issues identified for analysis included many ominous sounding threats such as Risk of Upset/Human Health. Even issues that have potentially positive benefits seem to focus only on the negative aspects. The issue "Population and Housing" could result in additional economic benefits through employment in the construction trades and sales of building materials. The issue "Transportation/Circulation" would provide employment for highway repairmen and possibly increased local sales of fuel, tires, automobiles, auto parts, etc.

While we acknowledge that the appearance of Redlands Canyon and Manly Falls will definitely change and that there will potentially be some temporary impacts to wildlife and vegetation, many positive benefits would result from this project. It is the belief of the HDMUC that the positive aspects should receive equal consideration during the development of the EIS/EIR. Items that should be considered include; local employment (direct and indirect), increased sales of goods and services, royalties paid to the Federal and local governments, financial benefits for the local school system, taxes (corporate and personal), and other positive benefits to the currently depressed local economies.

2. The EIS/EIR should also include the social benefits provided by the mineral commodities mined. Such as medical products and benefits, electronic products, contributions to the aerospace industry, and other uses that benefit society.

Please include my name on your mailing list to receive the draft environmental document and other future information related to this project.

For clarification or additional information regarding our concerns, please contact me at (619) 375-2629 during the evenings or (619) 939-2114 at my place of employment.

Thank you for your consideration and this opportunity to express our concerns.

Sincerely,

R Schiller

Ron Schiller, Chairman

PARSONS BEHLE & LATIMER

A Professional Law Corporation

January 7, 1993

Dave Taylor, Project Manager
Bureau of Land Management
Ridgecrest Resource Area
300 South Richmond Road
Ridgecrest, CA 93555

Re: Notice of Intent; Proposed Briggs Project Inyo County, California

Dear Mr. Taylor:

We would appreciate receiving further information concerning the above-noted project. Will you please place Patrick J. Garver on your mailing list.

Thank you for your time.

Very truly yours,

Alexa S. Baxter
Secretary to PATRICK J. GARVER

ONE UTAH CENTER • 201 South Main Street, Suite 1800 • Post Office Box 11898 • Salt Lake City, Utah 84147-0898 • Telephone 801-532-1234 • Facsimile 801-536-6111

ORRICK, HERRINGTON & SUTCLIFFE

Direct Dial
(213) 612-2415

October 7, 1992

Mr. Lee Delaney
Area Manager
Bureau of Land Management
300 South Richmond Street
Ridgecrest, California 93555-4436

Re: Proposed Mine in Redlands Canyon Area

Dear Mr. Delaney:

I understand that a cyanide heap leach mining operation has been proposed for the Redlands Canyon area of the Panamint Valley. Please let me know it this is correct, and if so, send me notice of any proposals and actions.

Very truly yours,

W. Douglas Kari

WDK:mp

LA1-32134.1
1-511502-WDK-10/07/92

777 South Figueroa Street • Los Angeles, California 90017
Telephone 213 629 2020 • Facsimile 213 612 2499
San Francisco 415 392 1122 • New York 212 326 8800 • Sacramento 916 447 9200

SIERRA CLUB

California/Nevada RCC Mining Committee
P.O. Drawer W, Independence, CA 93526
Stan Haye, Chair. (619) 878-2244

RECEIVED
JAN 25 1993
INYO CO. PLANNING DEPT.
1/22/93

Dear Sir:

We have reviewed the Scoping Document and proposed Plan of Operation for the Briggs Project in the Panamint Valley. We have the following concerns with the project:

1. The open pit should be backfilled, at a minimum to a level that will ensure drainage. This will allow the natural flow of water down Redlands Canyon (when it has water) and the natural drainage pattern of water spreading out on the alluvial fan, instead of having water trapped in the pit. Partially filling the pit will also preclude the formation of a pond of unknown water quality, but very probably contaminated with heavy toxic metals and/or other poisons.

2. There should be a study of the effects of the wellfield on the water table under the valley. This should include a map which shows all of the springs and seeps in the area, both seasonal and permanent, on and around the edges of the lake bed, modeling and mapping to predict the cone of depression caused by pumping, and provision for mitigation and/or stopping pumping if any of the springs or seeps are affected. A study of the effects of lowering the water table on the seasonal filling of the lake bed with a shallow pond, which when it happens is important to shorebirds and migrating waterfowl, should also be included.

3. Aesthetics are a very important component of this project. Therefore, there should be a section in the EIR/S that considers in one place all of the visual impacts of the project. This should include a requirement for concurrent reclamation to the maximum extent possible, detailed consideration of how the waste and spent ore piles could best be reshaped and used to reduce the visual impact (ie, be backfilling them), and photographs from the S. Panamint Valley Road from the vicinity of the old Pruett millsite retouched to show how the project will appear during its maximum operation and how it will appear when reclamation is complete. Buildings should be painted in a pattern of earth tones so that they blend into the landscape as much as possible. And, although varnishing the pit walls will help mitigate visual impacts, the color and texture of the waste rock and spent ore piles also need to be blended into the natural surroundings.

4. Although we are pleased that the operating plan calls for burial of the cyanide solution emitters, we also believe that a completely closed system, using tanks instead of ponds for the barren and pregnant solutions, are necessary to save water and completely protect wildlife.

To explore, enjoy, and protect the wild places of the earth. . .

SIERRA CLUB MINING COMMITTEE SCOPING COMMENTS ON BRIGGS PROJECT P.2

5. Road maintenance and dust control (at proponents expense) needs to be provided for Ballarat and South Panamint Valley Roads. If there is any significant heavy truck traffic, information needs to be included as to whether or not Trona Wildrose Road was engineered and constructed to withstand such traffic, and provision for proponent to pay for the maintenance of this road if necessary.

6. Propane should be used to the maximum extent possible to fuel all mobile and stationary equipment, to reduce air emissions.

7. It is important that bonding is adequate. There is no assurance that Canyon Resources will actually operate this project -- they can sell or lease all or part of their interests in the project. The reclamation and mitigation plan should be as complete and detailed as possible, leaving nothing to chance later.

8. The section on economic impacts should spell be detailed and complete. The project proponent should be required to pay any extra expense which would be incurred by Inyo, Kern, or San Bernardino Counties, such as for road maintenance, police and fire services, schools, hazardous materials training and handling, etc. Economic impacts to the three counties should be broken down, and separately considered. The direct property taxes would all go to Inyo County, but the sales tax and employment benefits would mostly go to the other two counties, as well as expenses for social services. A proper allocation is important. Is there any specific commitment to hire locally (and now is locally defined)?

9. Information on threatened and endangered species, and mitigation and protection for them if any are found, should be included.

10. So that the people can ensure that there is good stewardship of their resources, and ensure that the provisions of the reclamation plan are being carried out in good faith, all monitering records and data should be available to the general public, at the cost of copying, during regular business hours. At least semiannually there should be publically announced tours of the project, open to all members of the public in general and agency personnel, so that the reclaimed areas or the areas undergoing reclamation can be inspected. Also, when reclamation is complete, there should be one final public tour so that compliance with the terms of the reclamation plan can be determined, and a public hearing to consider whether or not reclamation has been properly accomplished, before the bond is released.

We thank you for your consideration of these matters. Please keep our name on your mailing list. Please send us a copy of the draft EIR/S and the Operating Plan when it is available.

Sincerely,

Stan Haye

Stan Haye

SIERRA CLUB
KERN-KAWEAH CHAPTER

P.O. Box 1106
Ridgecrest, CA 93556
January 14, 1993

Bureau of Land Management
Ridgecrest Resource Area
300 S. Richmond Rd.
Ridgecrest, CA 93555

att: Dave Taylor

Gentlemen,

I would appreciate being placed on the mailing list to receive reports and other documents relevant to the proposed Briggs Mining Project in Inyo County.

As I was unable to attend the "Public Scoping Meeting" of January 12th, I would also appreciate receiving a copy of the material distributed at that time.

Thank you for your help.

Sincerely yours,

Rudolph B. Amster

Executive committee

copy to: G. Theotig
J. Stilwell

USDI Bureau of Land Management
Ridgecrest Resource Area
300 South Richmond Road
Ridgecrest, California 9355
Attn: Dave Taylor

Dear Mr. Taylor, Jan 22, 1993

This letter is about the proposed Briggs mine in Redlands Canyon. I attended the scoping meeting on Jan 12, representing the Owens Peak Group, Kern-Kaweah Chapter of the Sierra Club. I am writing this as Conservation Chair of the group. I appreciated the opportunity to comment at the meeting and now to follow up in writing.

We have some concerns about the project and oppose it now, based on information currently available. It is our hope that in time we will be reassured if our worries are adequately addressed.

Several of our members have said they hate to see such a large operation marr the natural beauty of the area. Panamint Valley is almost unique in its lack of large-scale human impact. It is an important resource to people as a place of remoteness, beauty, and solitude. As California's population continues to increase and as cities like Ridgecrest keep growing, there will be fewer and fewer areas like Panamint Valley left in relatively pristine condition, at least on a macro scale. This is a major concern to many of us.

A large part of the problem could be solved if the pit were to be backfilled after the mining is finished. This seems essential for proper resource management. Of course, landscaping and revegetating the whole disturbed area with seed gathered now before the project starts are must-do steps for the rehab phase.

Another point that bothers us is the general problem of water use. Even though the water in the valley is salty, it supports its own special ecosystem. Having walked often in the lowest parts of the valley, I deeply value this wonderful part of the desert. Flora and fauna that live there should not be stinted. Water studies are important and need to be done before pumping is allowed.

Other considerations are what this could do to water and air quality. Finally, what does this mean to local taxpayeres?

Thank you for your interest in our ideas. We would appreciate being put on your mailing list and receiving the Environmental Impact Statement when it comes out.

Sincerely,

Jeanie G. Stillwell

Jeanie A. Stillwell
Conservation Chair
Owens Peak Group, Sierra Club
P.O. Box 1569
Ridgecrest, Ca 93556

INDIVIDUALS

Don Connolly
Ballarat Town Site
P.O. Box 63
Trona CA 93562

Feb. 12, 1993

Bureau of Land Management
300 Richmond Rd.
Ridgecrest CA 93556

Re: Canyon Resources Inc.
Panamint Valley Project
(Briggs Camp)

Dear B.L.M.

I would like to request that a suspension be put in effect on the above named application for open-pit mining until Canyon Resources Inc. gives proper notification to all parties concerned.

My reasons for this request is as follows:

1: Although probably in technical compliance with regulations by publishing notice of a public comment hearing in a newspaper, Canyon Resources is aware that this is a remote area and residents do not have access to these newspapers. I am the only resident on their proposed access route in Panamint Valley yet I have not been informed of any of their plans, even though their representitive passes within thirty feet of my door several times a week.

2: Canyon Resources has failed to give proper notice to my landlord, Ballarat Owners Group. Several of the partners report that they were given only three days notice by telephone of the public comment hearings in Ridgecrest. Others report no notice at all. Most all of the partners live over two hundred miles from Ridgecrest and three days notice was not sufficient time time for them to prepare their comments or arrange for a representitive to attend this hearing.

3: Operators of an unpatented mine between Ballarat and Briggs Camp report that they were not aware of any hearings until they read it in an old newspaper.

The size and scope of Canyon Resources projected operations will have a tremendous impact on the lives of the residents and landholders near their operations and along their access route. By publishing notice in newspapers they know are not available to Panamint Valley residents, and holding hearings in towns located fifty miles and ninety miles from their operations, Canyon Resources has shown their lack of concern for the health, safety and quality of life of those that their operations will impact most. Before any further action be taken on their permit applications, I request the following:

Canyon Resources, Inc (cont.)

1: That Canyon Resources Inc. be required to survey any and all persons and landholders that are users of the public roads they will be using in Panamint Valley.

2: That Canyon Resources Inc. compile a mailing list of these and any other parties showing interest in their operations here.

3: Canyon Resources should then be required to to keep these parties informed, either by mailing or personal delivery, of all further actions they plan to take. Notice of any hearings, applications, zoning variances, etc. shall be provided at least thirty days in advance.

4: An additional public comment hearing should be scheduled to be held in Panamint Valley, not some town fifty or ninety miles away. I have grave concerns about Canyon Resources' projected operations and due to financial and travel restraints I am unable to voice my comments due to this policy of no hearings within fifty miles of their mining property.

5: Canyon Resources Inc. should be made to complete the clean-up of the chemical spill their drilling contractor caused before any further action be taken on their application. That they have let this spill remain on a public road for over two months is, I fear, indicatative of their lack of concern of their commitment to comply with federal state and county requirements, and most important of all, their lack of concern for the safety of those whose lives they are impacting.

Thank you;

Don Connolly
Ballarat, Panamint Valley

Mary DeDecker
Botanist

140 PAVILION STREET
P.O. BOX 506
INDEPENDENCE, CA. 93526
(619) 878-2389

January 5, 1993

Re: Conditional Use Permit
No. 92-3/CR Briggs, Inc.

Inyo County Planning Department
168 North Edwards Street
Post Office Drawer L
Independence, CA 93526

Contact: Charles Thistlethwaite

U.S. Bureau of Land Management
Ridgecrest Resource Area
300 South Richmond Road
Ridgecrest, CA 93555

Contact: Dave Taylor

Dear Sirs:

Thank you for sending your Notice of Preparation document to members of the Mineral and Natural Resources Committee of Inyo County. I received my copy December 26, 1992.

It is unlikely that our committee will consider the proposal before the EIR comes out. This is to give you my own concerns, however, in the hope that they will be covered in the EIR. They are as follows:

1. 450 acres of cleared surface is large enough that it could be significant to fauna. The name of the plant community or the dominant plant species should be named in order to determine the value involved.

2. The Panamint Range is rich in rare plant species. These are mostly on limestone and/or dolomite. If those formations occur within the impacted areas they should be indicated. If not it should be so stated.

3. It appears from your plot plan that Manly Fall will be destroyed. If so, that should be stated under R. Aesthetics. Destruction of a major desert fall is significant, even though the view of it may be restricted.

4. On page 10, T 3 under Cultural Resources you state, "No physical change that would affect unique ethnic or cultural values are expected". Does it impact the fall below Redlands Spring? If not, please state that. Redlands Canyon was the escape route of the Death Valley '49er party led out by Manly and Rogers. That upper fall, "Ox-jump Fall" was a critical site on that route, so it is important in the history of Death Valley.

5. The use of cyanide is so deadly that we should know how it is being used. (It appears that a mining operation east of Independence wiped out the local populations of long-eared bats.)

Will this project use a drip system or will the solution be ponded? If in ponds, how will they be covered?

6. Finally, as a citizen of Inyo County, I am concerned over financial impacts. It is unfortunate that Inyo cannot house the employeees of the project, so we will not benefit from those residents. Will the taxes we gain exceed the cost of any road construction or maintenance that may be required? What about other county services such as law enforcement and waste disposal?

The contact person for our Inyo Mineral and Natural Resources Committee is Walter Pachucki, Chairman.

Yours very truly,

Mary DeDecker

Mary DeDecker

43404 N. Galion Ave
Lancaster, CA 93536

BLM, Ridgecrest R.A.
300 S. Richmond Rd.
Ridgecrest, CA 93555

Sirs,

I have received your notice of scoping meetings on the so-called Briggs Project in the Panamint Valley. I cannot make the meetings you have scheduled, but have a strong interest in the potential impacts of this development.

Your preliminary list of Environmental Issues seems reasonably complete. I cannot emphasize enough the problems that may occur with water usage & groundwater impacts through both/either depletion and/or contamination. The visual impacts will be overwhelming and incredibly difficult to mitigate, and will need extensive discussion in your EIS ——.

Thank you for the opportunity to comment in advance of the preparation of this EIS.

Jim Dodson

WRITTEN STATEMENT

BRIGGS PROJECT EIS/EIR

Submit to Bureau or County representative at this meeting or fold, stamp, and mail to the Bureau as indicated on reverse. Statements should be mailed to reach the Bureau by January 25, 1993.

To Canyon Rescources Corp. and Bureau of Land Management:

Having attended the public scoping meeting on Jan. 13th in Lone Pine, my concerns regarding the proposed Briggs Mining Project are:

1. That the flora of the site be re-surveyed this spring. The results following a wet winter may be considerably different than that made previously.

2. That the EIR address in detail the large quantity of water required for heap leach mining mining in this arid area. What effect will removal of surface and ground water have on the plants and animals of the area?

3. That the processing ponds be completely and adequately covered to prevent attraction and/or consumption by animals or birds.

4. That complete restoration of the area be guaranteed at the finish of the project.

Martha S. Gilchrist

Submitted By: Martha S. Gilchrist
Name (please print)
concerned citizen
Agency/Affiliation
Rte. 2, Box 89
Street Address
Lone Pine, CA 93545
City State Zip

WRITTEN STATEMENT

BRIGGS PROJECT EIS/EIR

Submit to Bureau or County representative at this meeting or fold, stamp, and mail to the Bureau as indicated on reverse. Statements should be mailed to reach the Bureau by January 25, 1993.

The Executive Committee of the Range of Light Group of the Toiyabe Chapter of the Sierra Club thank you for the opportunity to comment on the Briggs Project. Many of the members of the Range of Light Group reside in Inyo County and have expressed concerns about this Project. The concerns are:

(1.) Considering the proximity of the Project to Wilderness Study Areas, is this an appropriate activity at the mouth of Redlands Canyon? We think this project impacts upon the quality and quantity of existing and future recreational opportunities and a conflict exist.

(2.) Aesthetic impacts especially viewsheds from adjacent WSAs and roads in the region (The Trona-Wildrose road is one of the gateways" to Death Valley NM)

(3.) Changes in the course of ephemeral surface flows of water could adversly impact plants and animals in adjacent WSAs. There is also a potential risk of release of contaminants during flashfloods into adjacent WSAs.

Submitted By: Bette Goodrich
Name (please print)
Conservation Chair, Range of Light Group
Agency/Affiliation
Toiyabe Chapter Sierra Club
Route 1 Box 82
Street Address
Crowley Lake, CA. 93546
City State Zip

WRITTEN STATEMENT

Page 1

BRIGGS PROJECT EIS/EIR

Submit to Bureau or County representative at this meeting or fold, stamp, and mail to the Bureau as indicated on reverse. Statements should be mailed to reach the Bureau by January 25, 1993.

Jan. 15, 1993

1. Are the leach ponds to be fenced deep enough into the soil to keep small mammals out?

2. What about a fence on the upper edge of the project to keep large mammals such as sheep etc. from falling into the pit?

3. "Barrow" is misspelled. You spelled it borrow.

4. What happens if the monitore fail? What is the life of the monitors?

5. You said there will be a floating devices to prevent birds from using any pondirg. I hope an effective something will be done to protect the birds in our arid land.

6. Why is it considered acceptable to build a leach pong across a fault zone?

7. There should be a map that shows fault lines/zones in Panaming Valley especially near or at the site of operation. There is reported geologic evidence that there has been extensive tectonic activity in Panamint Valley the last 9-10 thousand years.

8. Is there a fault zone along the base of the Paramints and what is the relationship to the proposed leach pond??

9. How is the Project going to keep the mycorrhizal fungi alinve in the stock piled "growth media"? Erosion by rain and deflation by wind action

Submitted By: MARY Ann Henry
Name (please print)

Agency/Affiliation

329- Perdew
Street Address

Ridgecrest, CA. 93555
City State Zip

is an issue here.

10. Is the Project collecting seeds now for the revegetation plants? These plants should be site/area specific for maximum success.

11. The Redlands Canyon diversion is of real concern. Are they kidding themselves they can really stop nature in a rain event? And the leach pond is on the alluvial fan!!!

12. Sorry, but I don't believe for a minute that Redlands Spring and its water supply is safe during the life of the Project.

13. The introduction of exotic species such as Salsola is of concern. or the germination of seeds already present is of concern. Salsola thrives on disturbed soil. What plans are there to eliminate exotic species such as Salsola during the reclamation process?

14. Of concern and should be addressed is the possibility of a rain event saturating the alluvial fan and an earthquake concurrently and the whole thing slipping, sliding down the hill with the leach pad on it ??

Thank you for the Scoping Meeting on Jan 13 1993 and the opportunity to make written comments on the proposed Briggs Project.

Mary Ann Henry

Mary Ann Henry

Ronald Henry

P.S. 15. Does the Project put up a bond at the beginning of the operation to cover reclamation costs?

LEROY AND JEAN JOHNSON
2595 COHANSEY STREET, ROSEVILLE, MINNESOTA 55113
612-483-1061 (home)
612-649-5242 (office)

Bureau of Land Management
Ridgecrest Resource Area
300 South Richmond Road
Ridgecrest CA 93555

20 January 1993

Dear Dave Taylor,

Thanks for returning my call. We have had a long interest in the Redlands Canyon area and we welcome the opportunity to comment on the Briggs Project.

Redlands Canyon is the escape route of the Bennett-Arcan party from Death Valley in winter 1849-1850. We came to this conclusion after more than 10 years of field and library research, which is summarized on our book: Escape from Death Valley, 1987, University of Nevada Press (see enclosed reviews). We are not alone in this conclusion; John Wolff. (Route of the Manly Party of 1849-50 in Leaving Death Valley for the Coast, 1931) and George Koenig (Beyond This Place There Be Dragons, 1984) came to the same conclusion. We are considering nominating the escape route as a National Historic Trail, but we have not accomplished that goal as yet.

The mining operation at the head of Redlands Canyon will disrupt this important historic trail; thus, the mining company must provide access into and out of the canyon for hikers. As an example of the trail's use, we hiked it last February with 12 people while filming a historical movie for TV (see enclosed letter dated 15 February 1992 to Shirley Harding).

In Harry Briggs' day, the Indian trail was easily traceable around Manly Fall. In February, 1992, I could find only a short segment of the trail in one of the switch-backs of the mining road near the top of the fall. The rest had been destroyed by the new roads. However, the trail is traceable on the fan below the fall, it heads in a southwesterly direction from the guest house at Harry's place.

We would like to work with you and your staff to document these trail remnants before they are obliterated.

We do not like the idea of destroying Manly Fall, an unusual geologic feature in the Panamints, but we understand that it would be virtually impossible to save it. However, we would strongly object if the mining operation moved up the canyon toward Ox-Jump Fall, immediately below Redlands Spring (Escape p. 25 & note 75).

If the open pit mine does come to pass, we feel strongly that the mining company must construct a trail around the fall for hikers. The escape trail, which was actually an active Indian trail, skirted the fall on the north side. However, a bypass trail could leave the canyon bottom a few hundred yards up the canyon (near the prospects shown on the quad map) and switch-back to the valley floor. The trail should be of the quality for hikers but not for horses or mules.

Yours truly,

LeRoy & Jean Johnson

cc: Ed Rothfuss, DVNM & Mary DeDecker

EXCERPTS FROM REVIEWS OF ESCAPE FROM DEATH VALLEY

by
LeRoy and Jean Johnson
University of Nevada Press, 1987

"Escape from Death Valley is more than a retelling of a colorful and compelling story of the gold Rush. Rather, it is the wholly absorbing account of a modern quest by a pair of contemporary adventurers whose tenacity and dedication nearly matches that of Manly and Rogers.... Escape from Death Valley, then, is a family memoir, a historical monograph, and a field guide to the deserts of Nevada and California, as well as a tale of heroism in the Old West.... The firsthand narrative is vastly enriched by the meticulous and lenghy annotations provided by the Johnsons..." Jonathan Kirsch; Los Angeles Times April 16, 1987.

"The Johnsons are among a new breed of historican who not only research in libraries but also on the ground, attempting to locate with precision historic sites and trails.... There is a large body of literature about the Death Valley forty-niners... but the Johnsons offer the best guide to the subject to date. They provide a new and impressive dimension to this story by the thoroughness of their coverage.... Excellent maps facilitate reader comprehension." Merrill J. Mattes, Oregon and California Trail Aassociation; New Mexico Historical Review July 1988.

"Buffs of the history of the American West will find Escape from Death Valley a veritable treasure. The introductory material and edited historical text unveil stories of personal endurance so intriguing that the book is difficult to put down... Overall, Escape from Death Valley is exhilarating reading. I strongly recommend the book to public and school libraries." Duncan M. Aldrich, UNR; Highroller April/June 1987.

"Escape from Death Valley is the result of painstaking research by the authors..." David Wallenbrock, Western American Literature 1988.

"This unusual book demotes armchair historicans to the status of couch potatoes.... Clearly, the Johnsons have tried to make this book as near definitive as possible..... Devotees of Death Valley literature will find this book a major contribution to the field. The Johnsons write with considerable authority and persuasiveness..." Abraham Hoffman; Historical Society of Southern California 1988.

"Though debate and discussion on the various Death Valley '49er routes is bound to continue for years, Escape from Death Valley will silence a good number of these arguments, for this book is certainly the definitive study on the Manly route.... Historians and researchers will be delighted by the excellent annotation and footnotes.... Unlike most other Death Valley books, the various accounts have been printed in full.... The book is formatted to appeal to and accommodate a wide variety of audiences ... a must in any Death Valley collection." Robert Hoshide; The Californians Sept./Oct. 1988.

three sheep as they crossed a ridge to the west--quite a thrill. These are the first I've seen in this area. I found the enclosed sheep horn on the trail at the spring.

In the morning we filmed the fall and Jean and I led Elijah (who acted as the one eyed mule) around the fall and he witnessed the thrill and apprehension that Manly and Rogers felt as they took the mule around the fall. The mouth of Redlands Canyon is now a shamble. The mining company has dozed many roads and terraces an obliterated the Indian trail that skirted north of the 180' Manly Fall. I found a short section of the ancient trail in a road switchback near the top of the fall. I was able to find the Indian trail that connected the switch-back trail (that is now gone) with the valley trail that leads to Manly Pass. We were able to follow it for about 1/4 mile on the fan below Harry Briggs' old place.

Our next night was at the Silent Sepulcre deep in the heart of the Slate Range. We arrived at dusk and a light rain settled the dust. Just after dark, much to my amazement, a CJ-5 rolled into camp with a chest full of hamburgers! John Gosset's mother and father brought us all a hot dinner. I've hiked here many times but never in my wildest dreams could I imagine a jeep reaching this place. Rained lightly throughout the night and in the morning we filmed near the sign that now marks the point of so much hardship and deaths that awaited the Brier mess. Before we departed, I asked Leon to say a few words and we held service in this sacred and hallowed declivity.

The hike to the pass was enjoyable but hard. Enroute John found an Indian cave and rock alignment along the trail that the emigrants has taken in 1850. When we reached the pass, we were in a white-out and had to rely on altimeter and compass to find the canyon we wanted to descend. All went well and as we exited Isham Canyon the rain increased a bit and the wind picked up a little. We made a long, fast hike to Indian Joe Spring where we were met by many wonderful people who built us a large fire and had wonderful barbecue for all to enjoy. The rain picked up and we braved the storm, ate, and soon retreated to Trona where we found a warm bed.

The greatest thrill of the whole trip was seeing the signs that Leon Collard and his friends put up along the escape trail over the Slate Range. We would like to work with the NPS, BLM, '49ers, and others to make the escape trail a national historic trail—something else to do when I retire!

Yours truly,

LeRoy C. Johnson

p.s.--A word about John who I've had the pleasure of mentioning. He is 15 and can hike my legs off. He loves the desert and his father has trained him to respect every bush, animal, artifact, and historic site. He is one of the most knowledgeable people I have met when it comes to recognizing historic and ancient human imprints on the land. I was told that he is an excellent artist, which got me thinking that he would be an excellent volunteer to work with some of your archaeologists. If he ever applies for a paying or volunteer job with you, he can count on me for a strong reference.

LEROY AND JEAN JOHNSON
2595 COHANSEY STREET, ROSEVILLE, MINNESOTA 55113
612-483-1061

Shirley Harding
Death Valley Natural Monument
Death Valley, CA 92328

15 February 1992
(maided 28th)

Dear Shirley,

It was a grand hike from Galena Canyon to Trona. We hiked with a group of people I only knew via phone and I must say they were the most exciting group of people that I've ever hiked with. The Park Service placed faith in Elijah Collard Productions (of Savannah, TN) and their faith was well placed. Each of our two camps within the Park were left spotless. The night before we left, Elijah, our leader, reviewed his plans and stressed to all that our first consideration was safety: safety for the people and safety for the environment.

Before the trek, we stopped at the (Bennetts Well) Long Camp Monument where Leon Collard (Elijah's father), a retired minister, held a short service. It was moving and it brought tears to me. We then visited the possible site of Captain Culvewell's grave. We found this site in 1979 by deduction from Manly's comments. The small pile of rocks had a rusted shovel (which I have photographs of when we first found it. Sadly the shovel is now gone. I hope it is in your collection (I believe I had let you know of its location). However, the "grave" is within a few feet of the trail that the Death Valley '49ers trail riders' trail so it is possible the artifact is now in private hands. If this is Culverwell's grave, we deduce that the shovel was left there by a later party—not the Bennett-Arcan party (see note 89, Escape). Culverwell was buried and eventually the wind and coyotes uncovered his remains and the Hugh McCormack party probably reburied the remains, piled a few rocks over the grave, and left the shovel there. No way to prove this but the data fits.

We then drove to the end of the road that goes to Galena Canyon. From here, we hiked over "Galena Gap" and down into Warm Springs Canyon. Near the Gap are three "new sleeping circles"--the black, ugly type. When the miners closed out their operation, they rolled three huge (about 6' diameter) tires over the hill and they came to rest in the wash bottom. The only way to remove these tires would be via helicopter so they're probably there forever. I can only imagine the thrill the miners had as they watched the tires rolling down the open slope and bouncing high in the sky before coming to rest.

At Talc Mine Spring (in Galena Canyon) we found evidence of recent burro visits. Water flowed from the spring—only a trickle.

When we came down the other side we were met near the junction of the Warm Springs road by our ground support. Near that junction, we found an old

miners camp that has had little or no disturbance. The enclosed bottle is from the camp. There are only a few other artifacts there so it was undoubtedly a short-lived camp. The fact that this bottle was still in place makes me believe that tourists have not stumbled upon the site. There is what appears to be a hunting blind against a large boulder but after we determined it was a "white man's camp" we tentatively concluded the "blind" was a latrine. I took the bottle because, eventhough no one in our party would have disturbed the site, word does get around and I know the mentality of bottle collectors--see map for location.

Hiking hard all day, we only made it to the entrance to Butte Valley where we camped. Wind blew most of the night, which taught a lesson to Elijah. He pitched his tent, laid his bed roll, and toured the camp to see if everyone was OK. When he returned to his tent it was gone! With a little searching he found it intact but his sleeping bag had been dumped somewhere along the windy trail. With a little searching, everything was found.

The next morning we hiked to Arrastre Spring. En route to the spring we "found" an Indian camp site with ancient looking petroglyphs. They appear to be much older than those at the spring. From the spring four of us hiked to "Rogers Pass" and then to "Manly Lookout" while the rest enjoyed a rest at the spring. We camped south of the spring along the Indian Trail that the families used to reach Redlands Canyon. Here again the wind blew hard. Fortunately for those of us who went to the lookout, our tents were pitched and dinner was underway when we returned after dark.

En route to the lookout, I found the enclosed antler in a Mormon tea bush along the trail. This is the first evidence I've ever seen that mule deer are in the Panamints. One of our party, John Gossett, said he has seen deer several times in the Panamints. Assuredly this is a natural drop and can be taken as proof that the deer now frequent Arrastre Spring. I was amazed at how much the willows have engulfed the arrastre. I hope some day the arrastre can be cleared out so people can see and photograph it.

The trail to the pass is difficult to follow and is slowly vanishing. This is one of several historic trails in your Park that I feel should be maintained and marked. It wouldn't take much effort to sigh and clear the trail. This is a project I'll take on when I retire (don't get alarmed—it won't be with the aid of a D-8 Cat).

Our hike to Redlands Canyon was pleasant and rewarding--this too would make a good hiking trail. Along the Indian trail, John found a grave—or at least we assume it is a grave. The pile of rocks were about 6' long so at first we assumes it might be a miner. However, John soon found flakes and a "killed" portion of a metate. We also found evidence of pre-World War II military air maneuvers (enclosed). We found two of the enclosed 20mm brass casings with steel holders. This artifact is completely new to me. The cap has been struck by a firing pin: But how? The steel holder seems to prevent it. **If you have any information on this, please let me know what it is.** The other military finds were left in place.

We reached our camp in Redlands Canyon, below "Ox-Jump Fall" (and below the spring) just at dark. There is water flowing from the spring but the brush is so grown up that we did not visit the spring proper. The next morning we saw

WRITTEN STATEMENT

BRIGGS PROJECT EIS/EIR

Submit to Bureau or County representative at this meeting or fold, stamp, and mail to the Bureau as indicated on reverse. Statements should be mailed to reach the Bureau by January 25, 1993.

Thank you very much for the opportunity to make a statement in regard to the BRIGGS PROJECT EIS/EIR.

The site of the planned BRIGGS PROPERTY mining operation is located within an area which had been impacted by extensive mining operations in the past, Panamint Valley and Panamint Mountains are mining areas. Mine workings and access roads pre dating FLPMA are in existence throughout the Panamint Valley. Due to advenced technology heap leaching is no longer a threat to humans, fauna and flora. As I am residing close to two heap leach operations, I can assure you that there are no problems at all with this type of mining operations. I consider the BRIGGS PROJECT area an ideal location for a mining operation, as this type of landscape can easely be restored after all mining activities have ceased.

The employment of 155/150 persons at this operation, would not have any type of a negative impact on the immediate area, Ridgecrest or Trona. I see no reason why the mining operation with only 450 acres should be a problem for recreationists, as large areas within Panamint Valley and Mountains are open for recreation as well as many miles of road built and paid for by mining interests for mining purposes. The creation of new jobs should be the most important factor considered by BLM and Inyo County, when dealing with the permits for this mining operation.

Submitted By: Margaretha Krucker
Name (please print)

Agency/Affiliation
P.O. Box 323
Street Address
Mojave, California 93502
City State Zip

Margaretha Krucker.

John W. Nicoll
P.O. Box 323
Mojave, California 93502

Re.: BRIGGS PROJECT EIS/EIR.

Mr. Dave Taylor, Geologist
Bureau of Land Management
300 South Richmond Road
Ridgecrest, California 93502

Dear Dave,

I appriciate the opportunity to give a statement in regard to the Briggs Project.

Several years ago I did quite a bit of dozer work (D8H) within the planned project area. The work was done for several mining companies. This area has already been mined prior to my dozer work, this is certainly not a "sensitive" area after all this mining activity.

Knowing the area, I see no problems with noise,dust, human health, etc., as the nearest residential area would be Ballarat, which is about 6 miles to the north of the project.

The Briggs Project will not be a problem to recreation, the area of the project is only 450 acres, compared to all the open space in Panamint Valley and Panamint Mountains available for recreation. Most roads constructed by mine operators are also open to the general public.

I have worked with my equipment on heap leach operations,and find them safe and efficient.

It should be considered, that during 1992, gold was one of the major export commodities for the United States.

To have new jobs available in California, which the Briggs Project will make possible, should be the absolute priority for any agency involved in it.

Very sincerely yours,

WRITTEN STATEMENT

BRIGGS PROJECT EIS/EIR

Submit to Bureau or County representative at this meeting or fold, stamp, and mail to the Bureau as indicated on reverse. Statements should be mailed to reach the Bureau by January 25, 1993.

As a citizen of Lone Pine, I strongly support the requirement of a complete & comprehensive EIS/EIR regarding the proposed Briggs Project.

I am especially concerned about the impact of this extensive operation over several years on the indigenous plant and animal life. The use of cyanide solution & the disruption of 450 acres of land & move 27 million tons of rock is a monstrous undertaking that will affect a huge area.

I urge the enforcement of a battery of safeguards to protect the environment and all living things.

Submitted By: Carolyn M. Owen
Name (please print)
Citizen
Agency/Affiliation
Star Rt. 2 #90
Street Address
Lone Pine, CA 93545
City State Zip

WRITTEN STATEMENT

BRIGGS PROJECT EIS/EIR

Submit to Bureau or County representative at this meeting or fold, stamp, and mail to the Bureau as indicated on reverse. Statements should be mailed to reach the Bureau by January 25, 1993.

The most important aspect to address is that of reclamation. The area should be returned to as close to its original state as possible. The hole should be refilled insofar as possible. The leaching beds should be cleaned of cyanide and no contamination left. The issue of revegetation is complex and expensive. Generally speaking, desert plants do not reseed readily. Alternatives should be explored.

Also critical is the erosion and flooding potential which is high given the topography and general lack of vegetative cover. How are you going to allow for diversion of the intermittent water which will come with winter and summer storms? What happens if the ponds are overfilled or breached?

Is there sufficent water available locally for the leaching process? What are the impacts of water use and the drilling of a well?

Wildlife- Two threatened species are found near our site, the desert tortoise and the Mojave ground squirrel. What work has been done to find and mitigate any impacts to these two species?

Geology- The Pnamints are a very rapidly rising mountain range and the site is on or near a major fault. What are the potential hazards and problems and your anticipated solutions?

Submitted By: Carol Panlaqui
Name (please print)
Desert Tortoise Preserve Committee
Agency/Affiliation
P.O. Box 354
Street Address
Ridgecrest, CA 93555
City State Zip

APPENDIX C
SITE VICINITY SEISMIC DATA (HISTORIC EARTHQUAKE SEARCH)

DATE: Thursday, March 11, 1993

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*          E Q S E A R C H             *
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*             Ver. 2.00                *
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(Estimation of Peak Horizontal Acceleration
From California Earthquake Catalogs)

SEARCH PERFORMED FOR: ENVIRONMENTAL SOLUTIONS

JOB NUMBER: 92-274

JOB NAME: BRIGGS PROJECT

SITE COORDINATES:
LATITUDE: 35.9383 N
LONGITUDE: 117.1867 W

TYPE OF SEARCH: RADIUS
SEARCH RADIUS: 60 mi

SEARCH MAGNITUDES: 4.0 TO 9.0

SEARCH DATES: 1800 TO 1992

ATTENUATION RELATION: 1) Campbell (1991) Horiz. - Deep Soil & Soft Rock

UNCERTAINTY (M=Mean, S=Mean+1-Sigma): M

SCOND: 0

FAULT TYPE ASSUMED (DS=Reverse, SS=Strike-Slip): DS

COMPUTE PEAK HORIZONTAL ACCELERATION

EARTHQUAKE-DATA FILE USED: ALLQUAKE.DAT

TIME PERIOD OF EXPOSURE FOR STATISTICAL COMPARISON: 50 years

SOURCE OF DEPTH VALUES (A=Attenuation File, E=Earthquake Catalog): A

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (GMT) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
DMG	36.400	118.000	7/ 5/1871	21 6 0.0	3.0	5.20	0.008	II	55 [89]
DMG	36.000	117.000	11/ 4/1908	837 0.0	3.0	6.50	0.160	VIII	11 [18]
DMG	36.000	117.000	11/10/1916	911 0.0	3.0	5.50	0.088	VII	11 [18]
MGI	35.500	118.000	3/23/1918	1515 0.0	3.0	4.60	0.005	II	55 [88]
DMG	35.500	117.230	5/29/1930	71216.0	3.0	4.10	0.010	III	30 [49]
DMG	35.700	117.800	7/ 7/1930	12 9 0.0	3.0	4.50	0.009	III	38 [61]
DMG	35.420	117.600	4/23/1931	2334 7.3	3.0	4.30	0.007	II	43 [69]
DMG	35.600	116.967	3/23/1932	02014.1	3.0	4.00	0.012	III	26 [42]
DMG	36.000	118.167	2/26/1933	655 0.0	3.0	4.00	0.003	I	55 [88]
DMG	35.833	118.000	2/ 8/1935	422 0.0	3.0	4.00	0.005	II	46 [74]
DMG	35.677	118.205	6/11/1935	162046.3	3.0	4.00	0.003	I	60 [96]
DMG	36.150	117.950	4/24/1936	19 0 0.0	3.0	4.00	0.005	II	45 [73]
DMG	35.648	118.187	1/19/1937	235738.5	3.0	4.00	0.003	I	60 [96]
DMG	35.967	117.917	9/10/1937	1934 0.0	3.0	4.00	0.006	II	41 [66]
DMG	36.000	118.033	9/18/1937	837 0.0	3.0	4.00	0.004	I	47 [76]
DMG	35.546	117.072	7/26/1938	63457.9	3.0	4.00	0.011	III	28 [45]
DMG	35.631	117.513	9/17/1938	1423 4.1	3.0	5.00	0.020	IV	28 [45]
DMG	36.007	117.720	1/ 7/1939	202150.2	3.0	4.50	0.013	III	30 [49]
DMG	36.000	117.583	8/15/1939	154818.0	3.0	4.00	0.015	IV	23 [36]
DMG	36.397	117.824	12/ 1/1939	13 5 5.1	3.0	4.00	0.004	I	48 [77]
DMG	35.933	116.867	12/19/1939	2012 9.0	3.0	4.00	0.020	IV	18 [29]
DMG	35.807	116.955	12/30/1939	5 047.6	3.0	4.00	0.023	IV	16 [25]
DMG	36.800	117.100	3/25/1940	211818.0	3.0	4.00	0.003	I	60 [96]
DMG	36.250	117.967	6/22/1942	221351.0	3.0	4.00	0.004	I	49 [78]
DMG	36.250	117.967	6/22/1942	2351 3.0	3.0	4.00	0.004	I	49 [78]
DMG	36.250	117.967	10/16/1942	10 727.0	3.0	4.00	0.004	I	49 [78]
DMG	36.133	117.967	5/30/1943	75054.0	3.0	4.00	0.005	II	46 [73]
DMG	36.017	117.933	9/16/1943	01611.0	3.0	4.00	0.006	II	42 [68]
DMG	36.017	117.933	9/16/1943	75222.0	3.0	4.50	0.008	II	42 [68]
DMG	35.353	117.826	7/ 3/1944	53823.5	3.0	4.70	0.006	II	54 [87]
DMG	35.887	117.752	8/ 9/1944	14 1 6.0	3.0	4.00	0.009	III	32 [51]
DMG	35.933	117.767	8/12/1944	82520.0	3.0	4.10	0.009	III	32 [52]
DMG	36.400	117.917	12/23/1944	81622.0	3.0	4.70	0.006	II	52 [83]
DMG	36.104	117.986	7/26/1945	101058.8	3.0	4.10	0.005	II	46 [74]
DMG	35.753	117.986	3/15/1946	1321 0.9	3.0	5.20	0.010	III	47 [75]
DMG	35.725	118.055	3/15/1946	134935.9	3.0	6.30	0.019	IV	51 [82]
DMG	35.715	118.074	3/15/1946	14 035.4	3.0	5.30	0.009	III	52 [84]
DMG	35.778	118.051	3/15/1946	15 0 9.2	3.0	4.40	0.005	II	50 [80]
DMG	35.714	117.977	3/15/1946	191853.6	3.0	5.40	0.012	III	47 [75]
DMG	35.751	118.029	3/15/1946	215433.4	3.0	5.20	0.010	III	49 [79]
DMG	35.733	118.033	3/15/1946	2254 2.0	3.0	4.20	0.005	II	49 [80]
DMG	35.745	118.039	3/16/1946	94617.9	3.0	5.10	0.009	III	50 [80]
DMG	35.733	118.033	3/16/1946	13 7 5.0	3.0	4.10	0.004	I	49 [80]
DMG	35.733	118.033	3/16/1946	195359.0	3.0	4.00	0.004	I	49 [80]
DMG	35.674	118.078	3/17/1946	6 347.1	3.0	4.40	0.005	II	53 [86]
DMG	35.733	118.033	3/17/1946	211835.0	3.0	4.00	0.004	I	49 [80]
DMG	35.733	118.033	3/18/1946	115 9.0	3.0	4.10	0.004	I	49 [80]
DMG	35.733	118.033	3/18/1946	3 022.0	3.0	4.10	0.004	I	49 [80]
DMG	35.723	118.035	3/18/1946	10 555.1	3.0	4.90	0.008	II	50 [80]
DMG	35.780	117.921	3/18/1946	154925.7	3.0	4.80	0.009	III	43 [68]
DMG	35.747	117.908	3/18/1946	155042.6	3.0	5.30	0.013	III	42 [68]
DMG	35.733	118.033	3/18/1946	16 346.0	3.0	4.10	0.004	I	49 [80]
DMG	35.733	118.033	3/22/1946	10 833.0	3.0	4.10	0.004	I	49 [80]
DMG	35.733	118.033	3/24/1946	25646.0	3.0	4.40	0.005	II	49 [80]

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (GMT) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
DMG	35.738	117.981	3/24/1946	51727.8	3.0	4.10	0.005	II	47 [75]
DMG	35.728	118.099	3/24/1946	20 0 3.0	3.0	4.50	0.005	II	53 [85]
DMG	35.679	118.077	3/25/1946	233644.9	3.0	4.30	0.004	I	53 [85]
DMG	35.733	118.033	3/26/1946	6 713.0	3.0	4.10	0.004	I	49 [80]
DMG	35.687	117.869	4/12/1946	103433.7	3.0	4.00	0.006	II	42 [68]
DMG	35.789	118.204	4/16/1946	1037 4.7	3.0	4.10	0.003	I	58 [93]
DMG	35.832	118.046	4/24/1946	746 8.2	3.0	4.00	0.004	I	49 [78]
DMG	35.723	117.891	4/27/1946	223723.8	3.0	4.10	0.006	II	42 [68]
DMG	35.697	117.836	5/ 5/1946	9 343.7	3.0	4.20	0.007	II	40 [64]
DMG	35.752	117.744	7/22/1946	151932.9	3.0	4.10	0.009	III	34 [54]
DMG	35.646	117.895	8/31/1946	91012.8	3.0	4.20	0.006	II	45 [72]
DMG	35.677	118.067	2/ 6/1947	172040.1	3.0	4.60	0.006	II	52 [84]
DMG	35.813	117.669	3/ 9/1947	211045.2	3.0	4.00	0.010	III	28 [46]
DMG	35.679	117.955	5/26/1948	193512.2	3.0	4.10	0.005	II	47 [75]
DMG	35.582	118.159	7/26/1948	1750 1.4	3.0	4.50	0.004	I	60 [96]
DMG	35.156	117.004	3/20/1949	193449.7	3.0	4.40	0.004	I	55 [88]
DMG	35.772	117.948	6/25/1951	194541.7	3.0	4.60	0.008	II	44 [71]
DMG	35.761	117.953	6/26/1951	12639.1	3.0	4.40	0.007	II	45 [72]
DMG	35.883	116.967	11/24/1953	546 6.0	3.0	4.90	0.052	VI	13 [21]
DMG	35.833	116.633	4/ 9/1954	17 738.0	3.0	4.20	0.010	III	32 [51]
DMG	35.883	116.967	4/17/1954	101140.0	3.0	4.20	0.034	V	13 [21]
DMG	36.390	117.910	11/17/1954	72357.4	3.0	4.10	0.004	I	51 [82]
DMG	35.766	117.948	7/11/1956	1922 6.7	3.0	4.20	0.006	II	44 [71]
DMG	35.687	117.515	3/ 8/1957	132457.9	3.0	4.00	0.012	III	25 [41]
DMG	36.149	118.025	1/ 5/1959	1236 3.2	3.0	4.70	0.007	II	49 [79]
DMG	36.131	118.060	1/16/1959	010 5.3	3.0	4.30	0.005	II	51 [81]
DMG	36.152	118.067	1/19/1959	2146 0.1	3.0	4.10	0.004	I	51 [83]
DMG	35.745	118.023	10/24/1959	153515.3	3.0	4.20	0.005	II	49 [78]
DMG	35.147	117.131	7/ 1/1960	221344.6	3.0	4.50	0.005	II	55 [88]
DMG	35.778	118.049	1/28/1961	81246.2	3.0	5.30	0.010	III	50 [80]
DMG	36.500	117.000	10/ 1/1961	171632.0	3.0	4.20	0.007	II	40 [65]
DMG	35.831	117.761	10/19/1961	5 943.9	3.0	5.20	0.018	IV	33 [53]
DMG	35.397	117.773	11/18/1961	31836.0	3.0	4.30	0.005	II	50 [80]
DMG	35.754	118.044	9/16/1962	53616.0	3.0	4.90	0.008	II	50 [80]
DMG	35.750	118.050	9/16/1963	53616.0	3.0	4.90	0.007	II	50 [81]
DMG	35.388	116.761	10/25/1963	15 523.0	3.0	4.00	0.005	II	45 [72]
DMG	35.389	117.783	7/15/1966	10 943.0	3.0	4.00	0.004	I	51 [81]
DMG	35.106	117.346	10/11/1966	165912.9	3.0	4.40	0.004	I	58 [94]
DMG	36.503	117.631	3/ 2/1967	141248.8	3.0	4.40	0.006	II	46 [74]
DMG	36.450	117.120	1/ 4/1968	94543.1	3.0	4.00	0.007	II	36 [57]
DMG	35.414	117.796	7/ 8/1970	92530.2	3.0	4.00	0.004	I	50 [80]
DMG	35.770	117.586	12/30/1970	13 449.3	3.0	4.40	0.016	IV	25 [41]
DMG	35.805	117.631	7/ 4/1972	820 4.0	3.0	4.00	0.012	III	27 [43]
DMG	35.551	117.264	1/ 2/1974	134955.9	3.0	4.20	0.013	III	27 [44]
DMG	35.536	117.440	6/10/1974	64410.0	3.0	4.10	0.010	III	31 [50]
PAS	35.225	117.629	5/ 2/1975	18 323.1	3.0	4.20	0.004	I	55 [89]
UNR	36.000	117.617	12/19/1975	5 2 0.4	3.0	4.20	0.015	IV	24 [39]
PAS	35.729	118.023	6/14/1979	73928.3	3.0	4.60	0.006	II	49 [79]
PAS	35.827	117.770	4/19/1981	9 210.7	3.0	4.20	0.009	III	34 [54]
PAS	35.848	117.783	4/19/1981	9 249.7	3.0	4.40	0.010	III	34 [55]
PAS	35.831	117.775	4/19/1981	91957.1	3.0	4.00	0.008	III	34 [54]
PAS	35.778	117.747	3/ 1/1982	31022.3	3.0	4.20	0.009	III	33 [54]
PAS	35.760	117.747	3/ 7/1982	205012.8	3.0	4.30	0.010	III	34 [54]
PAS	35.757	117.761	3/ 7/1982	205059.9	3.0	4.50	0.011	III	34 [56]
PAS	35.750	117.730	3/ 8/1982	144246.0	3.0	4.00	0.008	III	33 [53]
PAS	36.600	117.029	3/16/1982	847 0.8	3.0	4.10	0.005	II	47 [75]

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (GMT) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
PAS	35.769	117.731	4/25/1982	41326.0	3.0	4.00	0.008	III	33 [53]
PAS	35.769	117.731	4/27/1982	154240.2	3.0	4.00	0.008	III	33 [53]
PAS	35.746	117.752	9/29/1982	1821 1.1	3.0	4.20	0.009	III	34 [55]
PAS	35.747	117.751	9/30/1982	223810.6	3.0	4.10	0.008	III	34 [55]
PAS	35.737	117.752	10/ 1/1982	1429 1.6	3.0	4.90	0.014	IV	35 [56]
PAS	35.720	117.759	10/ 1/1982	221021.9	3.0	4.50	0.010	III	35 [57]
PAS	35.756	117.767	10/ 1/1982	221031.3	3.0	4.30	0.009	III	35 [56]
PAS	35.724	117.759	10/ 1/1982	221128.8	3.0	4.10	0.008	III	35 [57]
PAS	35.750	117.759	10/ 4/1982	184328.5	3.0	4.00	0.008	II	35 [56]
PAS	35.811	117.739	12/31/1982	9 723.3	3.0	4.00	0.009	III	32 [52]
PAS	35.807	117.747	1/ 4/1983	3 3 5.1	3.0	4.00	0.008	III	33 [53]
PAS	36.205	117.866	8/16/1985	15121.2	3.0	4.20	0.006	II	42 [68]
USG	35.888	117.802	8/22/1985	01921.6	3.0	4.01	0.008	II	35 [56]
PAS	35.892	117.734	8/22/1985	02144.6	3.0	4.50	0.013	III	31 [50]
PAS	35.806	118.019	5/23/1986	114155.1	3.0	4.10	0.005	II	47 [76]
USG	36.154	118.048	9/ 9/1987	85723.0	3.0	4.07	0.004	I	50 [81]
USG	36.425	117.821	5/30/1988	172818.7	3.0	4.06	0.004	I	49 [78]
PAS	36.404	118.015	7/ 5/1988	181848.3	3.0	4.00	0.003	I	56 [91]
USG	36.428	117.851	8/10/1988	182452.4	3.0	4.02	0.004	I	50 [81]
GSP	35.530	117.370	12/20/1991	103829.3	3.0	4.10	0.010	III	30 [48]
GSP	36.026	117.889	2/19/1992	111924.9	3.0	4.10	0.007	II	40 [64]
GSP	35.160	117.362	6/29/1992	011813.4	3.0	4.70	0.006	II	55 [88]
GSP	35.161	117.350	6/29/1992	012615.6	3.0	4.10	0.004	I	54 [88]
GSP	35.362	116.800	6/29/1992	033626.8	3.0	4.00	0.005	II	45 [73]
GSP	35.681	117.614	6/30/1992	130536.5	3.0	4.70	0.015	IV	30 [48]
GSP	35.678	117.613	7/ 1/1992	061656.7	3.0	4.60	0.014	IV	30 [48]
GSP	35.683	117.617	7/ 2/1992	070104.9	3.0	4.20	0.011	III	30 [48]
GSP	35.675	117.620	7/ 2/1992	222529.1	3.0	4.30	0.011	III	30 [49]
GSP	36.085	117.679	7/27/1992	221059.8	3.0	4.10	0.011	III	29 [47]

-END OF SEARCH- 139 RECORDS FOUND

COMPUTER TIME REQUIRED FOR EARTHQUAKE SEARCH: 6.7 minutes

MAXIMUM SITE ACCELERATION DURING TIME PERIOD 1800 TO 1992: 0.160g

MAXIMUM SITE INTENSITY (MM) DURING TIME PERIOD 1800 TO 1992: VIII

MAXIMUM MAGNITUDE ENCOUNTERED IN SEARCH: 6.50

NEAREST HISTORICAL EARTHQUAKE WAS ABOUT 11 MILES AWAY FROM SITE.

NUMBER OF YEARS REPRESENTED BY SEARCH: 193 years

RESULTS OF PROBABILITY ANALYSES

TIME PERIOD OF SEARCH: 1800 TO 1992
LENGTH OF SEARCH TIME: 193 years
ATTENUATION RELATION: 1) Campbell (1991) Horiz. - Deep Soil & Soft Rock
*** TIME PERIOD OF EXPOSURE FOR PROBABILITY: 50 years

PROBABILITY OF EXCEEDANCE FOR ACCELERATION

ACC. g	NO.OF TIMES EXCED	AVE. OCCUR. #/yr	RECURR. INTERV. years	COMPUTED PROBABILITY OF EXCEEDANCE in 0.5 yr	in 1 yr	in 10 yr	in 50 yr	in 75 yr	in 100 yr	in *** yr
0.01	34	0.176	5.676	0.0843	0.1615	0.8282	0.9999	1.0000	1.0000	0.9999
0.02	6	0.031	32.167	0.0154	0.0306	0.2672	0.7887	0.9029	0.9553	0.7887
0.03	4	0.021	48.250	0.0103	0.0205	0.1872	0.6452	0.7887	0.8741	0.6452
0.04	3	0.016	64.333	0.0077	0.0154	0.1440	0.5403	0.6883	0.7887	0.5403
0.05	3	0.016	64.333	0.0077	0.0154	0.1440	0.5403	0.6883	0.7887	0.5403
0.06	2	0.010	96.500	0.0052	0.0103	0.0984	0.4044	0.5403	0.6452	0.4044
0.07	2	0.010	96.500	0.0052	0.0103	0.0984	0.4044	0.5403	0.6452	0.4044
0.08	2	0.010	96.500	0.0052	0.0103	0.0984	0.4044	0.5403	0.6452	0.4044
0.09	1	0.005	193.000	0.0026	0.0052	0.0505	0.2282	0.3220	0.4044	0.2282
0.10	1	0.005	193.000	0.0026	0.0052	0.0505	0.2282	0.3220	0.4044	0.2282
0.11	1	0.005	193.000	0.0026	0.0052	0.0505	0.2282	0.3220	0.4044	0.2282
0.12	1	0.005	193.000	0.0026	0.0052	0.0505	0.2282	0.3220	0.4044	0.2282
0.13	1	0.005	193.000	0.0026	0.0052	0.0505	0.2282	0.3220	0.4044	0.2282
0.14	1	0.005	193.000	0.0026	0.0052	0.0505	0.2282	0.3220	0.4044	0.2282
0.15	1	0.005	193.000	0.0026	0.0052	0.0505	0.2282	0.3220	0.4044	0.2282
0.16	1	0.005	193.000	0.0026	0.0052	0.0505	0.2282	0.3220	0.4044	0.2282

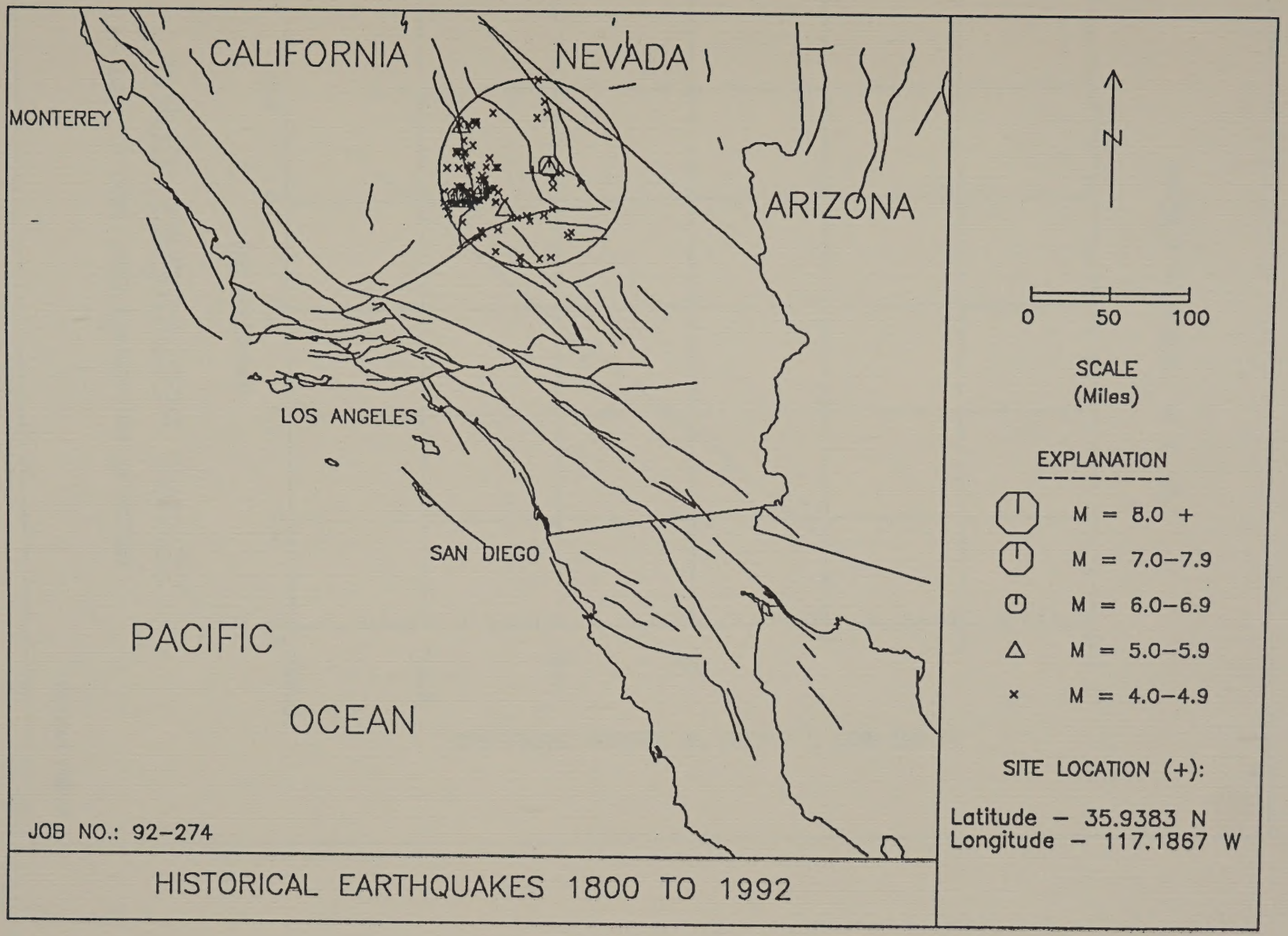
PROBABILITY OF EXCEEDANCE FOR MAGNITUDE

MAG.	NO.OF TIMES EXCED	AVE. OCCUR. #/yr	RECURR. INTERV. years	COMPUTED PROBABILITY OF EXCEEDANCE in 0.5 yr	in 1 yr	in 10 yr	in 50 yr	in 75 yr	in 100 yr	in *** yr
4.00	139	0.720	1.388	0.3024	0.5133	0.9993	1.0000	1.0000	1.0000	1.0000
4.50	38	0.197	5.079	0.0938	0.1787	0.8604	0.9999	1.0000	1.0000	0.9999
5.00	13	0.067	14.846	0.0331	0.0651	0.4901	0.9655	0.9936	0.9988	0.9655
5.50	3	0.016	64.333	0.0077	0.0154	0.1440	0.5403	0.6883	0.7887	0.5403
6.00	2	0.010	96.500	0.0052	0.0103	0.0984	0.4044	0.5403	0.6452	0.4044
6.50	1	0.005	193.000	0.0026	0.0052	0.0505	0.2282	0.3220	0.4044	0.2282

GUTENBERG & RICHTER RECURRENCE RELATIONSHIP:

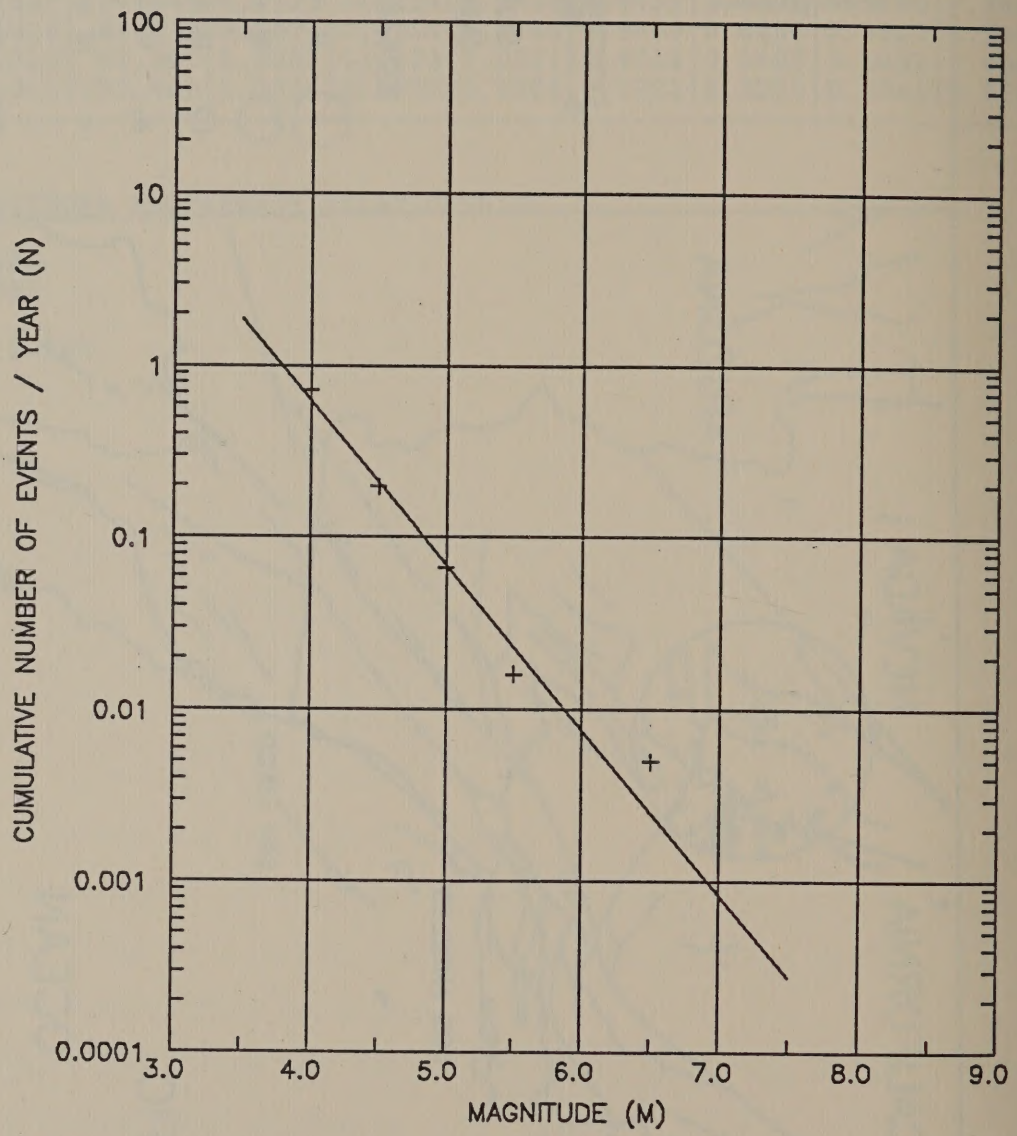
a-value= 3.624
b-value= 0.957

beta-value= 2.204



HISTORICAL EARTHQUAKES 1800 TO 1992

LOG N = 3.624 − 0.957M



SEISMIC RECURRENCE CURVE

HISTORICAL EARTHQUAKES FROM 1800 TO 1992

BRIGGS PROJECT

APPENDIX D
SUMMARY OF WATER QUALITY DATA FROM THE SITE VICINITY

TABLE 1

SUMMARY OF WATER QUALITY
GROUND WATER MONITORING WELLS
CANYON RESOURCES CORPORATION
BRIGGS PROJECT
(Period of Record from January, 1993 through February, 1994 (1))

Parameter	MW-1				MW-2				MW-3			
	Num (2)	Min	Max	Mean (3)	Num (2)	Min	Max	Mean (3)	Num (2)	Min	Max	Mean (3)
Field Temp, °C	12/0	25	29.5	28.6	14/0	28.9	32.5	31.6	8/0	27.8	31.7	28.6
Field pH, units	12/0	6.9	7.5	7.2	14/0	6.8	7.2	7.0	8/0	6.9	7.3	7.1
Field Elec. Cond.,μmhos/cm	12/0	12760	13400	13093	14/0	10350	11170	10835	8/0	14890	16200	15335
Lab pH, units	11/0	7.4	7.6	7.5	13/0	7.2	8.0	7.4	8/0	7.4	7.6	7.5
Lab, Elec. Cond.,μmhos/cm	11/0	13550	14400	13961	13/0	11300	11900	11584	8/0	16300	16800	16475
Turbidity, NT units	9/0	0.54	2.0	0.90	11/0	0.34	3.4	0.85	8/0	0.15	5.50	0.87
Total Alkalinity as CaCO3, mg/l	10/0	105	123.2	118.9	12/0	179	299	232	8/0	107	136	130
Total Dissolved Solids, mg/l	11/0	7900	8800	8397	13/0	6550	7300	6975	8/0	9800	10000	9919
Total Suspended Solids, mg/l	9/1	<0.5	11.7	5.4	11/4	<0.5	10.4	2.03	8/0	0.8	37.4	7.6
Chloride, mg/l	11/0	3838	4548	4229	13/0	3100	3531	3370	8/0	4860	5160	5074
Fluoride, mg/l	9/0	0.65	0.74	0.69(6)	11/0	0.52	0.60	0.56(6)	8/0	0.68	0.82	0.76
Sulfate, mg/l	11/0	600	640	620	12/0	630	670	645(6)	8/0	600	680	651
Total Sulfide, mg/l	11/11	<0.005	<0.1	(4)	14/14	<0.005	<0.1	(4)	8/8	<0.1	<0.1	(4)
Calcium, mg/l	11/0	259.4	280	272.4	13/0	214	240.8	227.3	8/0	279	298	289
Magnesium, mg/l	11/0	100	112	107	13/0	128	158.4	139	8/0	130	149	141
Sodium, mg/l	10/0	2430	2670	2554(6)	12/0	1970	2120	2048(6)	8/0	2840	3140	3022
Potassium, mg/l	9/0	64	74	68(6)	11/0	27	64	57(6)	8/0	74	87	81
Carbonate, mg/l	11/11	<1.0	<2.6	(4)	12/12	<1.0	<2.6	(4)	8/8	<2.6	<2.6	(4)
Bicarbonate, mg/l	11/0	128	157	146	12/0	218	293	278	8/0	130	166	158
Nitrate/Nitrite as N, mg/l	11/5	<0.1	0.47	0.24(5)	13/8	<0.1	0.40	0.21(5)	8/2	<0.1	0.3	0.24
Nitrite Nitrogen (NO2-N), mg/l	11/10	<0.05	0.27	0.11	13/12	<0.05	0.01	0.09(5)	8/8	<0.1	<0.1	(4)
Nitrate Nitrogen (NO3-N), mg/l	11/5	<0.01	0.20	0.20(5)	13/8	<0.1	0.4	0.21(5)	8/2	<0.1	0.3	0.24
Total Cyanide, mg/l	11/11	<0.002	<0.02	(4)	13/13	<0.002	<0.02	(4)	8/8	<0.01	<0.02	(4)
Ammonia as N, mg/l	11/1	<0.05	0.2	0.14	13/3	<0.02	0.13	0.04	8/7	<0.02	0.08	0.03
Aluminum, Diss., mg/l	11/10	<0.05	0.145	0.06	13/12	<0.05	0.08	0.06(5)	8/8	<0.05	<0.05	(4)
Antimony, Diss., mg/l	11/11	<0.003	<0.1	(4)	13/13	<0.003	<0.1	(4)	8/8	<0.1	<01	(4)
Arsenic, Diss., mg/l	11/7	<0.002	0.011	0.003	13/11	<0.002	0.003	0.003(5)	8/7	<0.002	0.002	0.002

Source: Hydro-Geo Consultants, Inc., 1994.

TABLE 1

SUMMARY OF WATER QUALITY
GROUND WATER MONITORING WELLS
CANYON RESOURCES CORPORATION
BRIGGS PROJECT
(Period of Record from January, 1993 through February, 1994 (1))

Parameter	MW-1				MW-2				MW-3			
	Num (2)	Min	Max	Mean (3)	Num (2)	Min	Max	Mean (3)	Num (2)	Min	Max	Mean (3)
Barium, Diss., mg/l	11/11	<0.1	<0.1	(4)	13/13	<0.1	<0.1	(4)	8/6	0.03	0.04	.08(5)
Beryllium, Diss., mg/l	11/11	<0.0003	<0.01	(4)	13/13	<0.0003	<0.01	(4)	8/8	<0.01	<0.01	(4)
Bismuth, Diss., mg/l	11/7	<0.0001	0.0014	0.0041(5)	3/13	<0.0001	0.0017	0.0034(5)	8/5	<0.0002	0.0011	0.0004(5)
Boron, Diss., mg/l	11/0	4.3	5.4	4.75	13/0	3.50	4.00	3.76	8/0	4.6	5.6	5.25
Cadmium, Diss., mg/l	11/11	<0.001	<0.005	(4)	13/13	<0.001	<0.005	(4)	8/8	<0.005	<0.005	(4)
Chromium, Diss., mg/l	8/8	<0.01	<0.01	(4)	10/10	<0.01	<0.01	(4)	8/8	<0.01	<0.01	(4)
Trivalent Chromium, mg/l	11/11	<0.01	<0.01	(4)	13/13	<0.01	<0.01	(4)	8/8	<0.01	<0.01	(4)
Hexavalent Chromium, mg/l	11/11	<0.005	<0.01	(4)	13/13	<0.005	<0.01	(4)	8/8	<0.01	<0.01	(4)
Cobalt, Diss., mg/l	11/11	<0.01	<0.01	(4)	13/13	<0.01	<0.01	(4)	8/8	<0.01	<0.01	(4)
Copper, Diss., mg/l	11/11	<0.01	<0.05	(4)	13/12	<0.01	0.02	0.02(5)	8/8	<0.01	<0.01	(4)
Iron, Diss., mg/l	11/11	<0.05	<0.1	(4)	13/4	<0.05	0.182	0.089(5)	8/8	<0.05	<0.05	(4)
Lead, Diss., mg/l	11/11	<0.005	<0.005	(4)	13/13	<0.005	<0.005	(4)	8/8	<0.005	<0.005	(4)
Manganese, Diss., mg/l	11/0	.062	0.19	0.11	13/0	0.108	0.333	0.165	8/7	<0.01	0.12	0.02
Mercury, Diss., mg/l	11/11	<0.0002	<0.001	(4)	13/13	<0.0002	<0.001	(4)	8/8	<0.0002	<0.0002	(4)
Molybdenum, Diss., mg/l	11/9	<0.01	0.014	0.011	13/13	<0.01	<0.01	(4)	8/8	<0.01	<0.01	(4)
Nickel, Diss., mg/l	11/10	<0.005	0.007	0.042(5)	13/13	<0.005	<0.05	(4)	8/8	<0.05	<0.05	(4)
Selenium, Diss., mg/l	11/9	<0.002	0.024	0.004	13/12	<0.002	0.002	0.003(5)	8/7	<0.002	0.002	0.002
Silver, Diss., mg/l	11/11	<0.01	<0.01	(4)	13/13	<0.01	<0.01	(4)	8/6	<0.01	0.02	0.01
Strontium, Diss., mg/l	9/0	5.8	7.0	6.3	10/0	6.4	7.5	6.9	8/0	6.6	8.7	7.7
Thallium, Diss., mg/l	11/11	<0.001	<0.005	(4)	13/13	<0.001	<0.005	(4)	8/8	<0.005	<0.005	(4)
Vanadium, Diss., mg/l	10/10	<0.01	<0.050	(4)(6)	12/12	<0.01	<0.05	(4)(6)	8/8	<0.05	<0.05	(4)
Zinc, Diss., mg/l	11/11	<0.01	<0.05	(4)	13/9	<0.01	1.12	0.105	8/8	<0.01	<0.01	(4)
Aluminum, Total, mg/l	4/2	<0.05	0.072	0.058	5/4	<0.05	0.24	0.088	3/3	<0.05	<0.05	(4)
Antimony, Total, mg/l	4/4	<0.1	<0.1	(4)	5/5	<0.1	<0.1	(4)	3/3	<0.1	<0.1	(4)
Arsenic, Total, mg/l	4/3	<0.002	0.003	0.002	5/4	<0.002	0.003	0.002	3/2	<0.002	0.002	0.002
Barium, Total, mg/l	4/4	<0.1	<0.1	(4)	5/5	<0.1	<0.1	(4)	3/2	0.04	0.04	0.08(5)
Beryllium, Total, mg/l	4/4	<0.01	<0.01	(4)	5/5	<0.01	<0.01	(4)	3/3	<0.01	<0.01	(4)

Source: Hydro-Geo Consultants, Inc., 1994.

TABLE 1

SUMMARY OF WATER QUALITY
GROUND WATER MONITORING WELLS
CANYON RESOURCES CORPORATION
BRIGGS PROJECT
(Period of Record from January, 1993 through February, 1994 (1))

Parameter	MW-1				MW-2				MW-3			
	Num (2)	Min	Max	Mean (3)	Num (2)	Min	Max	Mean (3)	Num (2)	Min	Max	Mean (3)
Bismuth, Total, mg/l	3/2	<0.0001	0.0022	0.0012 (5)	3/2	<0.0001	0.0011	0.0006 (5)	2/1	0.0008	0.0008	0.0006 (5)
Boron, Total, mg/l	4/0	4.1	4.5	4.3	5/0	3.1	3.6	3.42	3/0	4.89	5.1	4.96
Cadmium, Total, mg/l	4/3	<0.005	0.005	0.005	5/5	<0.005	<0.005	(4)	3/3	<0.005	<0.005	(4)
Chromium, Total, mg/l	3/2	<0.01	0.011	0.010	4/4	<0.01	<0.01	(4)	3/3	<0.01	<0.01	(4)
Cobalt, Total, mg/l	4/4	<0.01	<0.01	(4)	5/5	<0.01	<0.01	(4)	3/3	<0.01	<0.01	(4)
Copper, Total, mg/l	4/2	<0.01	0.02	0.01	5/5	<0.01	<0.01	(4)	3/3	<0.01	<0.01	(4)
Iron, Total, mg/l	4/0	0.062	0.186	0.120	5/0	0.082	0.297	0.164	3/3	<0.05	<0.05	(4)
Lead, Total, mg/l	4/4	<0.005	<0.005	(4)	5/5	<0.005	<0.005	(4)	3/3	<0.005	<0.005	(4)
Manganese, Total, mg/l	4/0	0.091	0.166	0.124	5/0	0.105	0.211	0.142	3/3	<0.01	<0.01	(4)
Mercury, Total, mg/l	4/4	<0.0002	<0.0002	(4)	5/5	<0.0002	<0.0002	(4)	3/3	<0.0002	<0.0002	(4)
Molybdenum, Total, mg/l	4/3	<0.01	0.013	0.011	5/4	<0.01	0.012	0.010	3/3	<0.01	<0.01	(4)
Nickel, Total, mg/l	4/4	<0.05	<0.05	(4)	5/5	<0.05	<0.05	(4)	3/3	<0.05	<0.05	(4)
Selenium, Total, mg/l	4/3	<0.002	0.002	0.002	5/4	<0.002	0.002	0.0036	3/2	<0.002	0.002	0.002
Silver, Total, mg/l	4/4	<0.01	<0.01	(4)	5/5	<0.01	<0.01	(4)	3/3	<0.01	<0.01	(4)
Strontium, Total, mg/l	4/0	5.83	6.6	6.23	4/0	6.5	7.0	6.72	3/0	7.6	8.1	7.87
Thallium, Total, mg/l	4/4	<0.005	<0.005	(4)	5/5	<0.005	<0.005	(4)	3/3	<0.005	<0.005	(4)
Vanadium, Total, mg/l	4/4	<0.05	<0.05	(4)	5/5	<0.05	<0.05	(4)	3/3	<0.05	<0.05	(4)
Zinc, Total, mg/l	4/3	<0.01	0.019	0.022	5/3	<0.01	1.03	0.22	3/3	<0.01	<0.05	(4)

NOTES: (1) Period of record for table - MW-1: monthly from 3/93 through 2/94
MW-2: 1/93 and monthly 3/93 through 2/94
MW-3: monthly 7/93 through 2/94

(2) Two values are presented: the first value is the total number of samples; second value is the number of samples with results less than detection limit.
(3) Summary statistics calculated using absolute value of detection limit for any result reported as less than detection limit.
(4) All values less than detection limit.
(5) Maximum detected value noted in this table is less than one of the detection limits for the analyzed parameter. Resulting mean is skewed high.
(6) The record for this parameter, at this station, includes at least one suspected anamolous value. These anamolous data are not included in the statistical analysis, however, are shown separately in Table 3, "Table of Anomolous Water Quality Data".

Source: Hydro-Geo Consultants, Inc., 1994.

TABLE 2

SUMMARY OF WATER QUALITY
REDLANDS SPRING - SW-1
CANYON RESOURCES CORPORATION
BRIGGS PROJECT
(Period of Record from January, 1993 through February, 1993 (1))

Parameter	Redlands Spring - SW-1			
	Num (2)	Min	Max	Mean (3)
Field Temp, °C	12/0	15.9	22.7	20.2
Field pH, units	13/0	7.7	8.1	7.9
Field Elec. Cond.,μmhos/cm	12/0	1264	1336	1291
Lab pH, units	13/0	8.0	8.1	8.1
Lab, Elec. Cond.,μmhos/cm	13/0	1220	1350	1271
Turbidity, NT units	11/0	0.14	0.3	0.20
Total Alkalinity as CaCO3, mg/l	12/0	125	140	130
Total Dissolved Solids, mg/l	13/0	752.4	1050	953
Total Suspended Solids, mg/l	11/8	<0.5	3.6	1.03
Chloride, mg/l	13/0	40.2	45.7	43.2
Fluoride, mg/l	13/0	0.27	0.60	0.34
Sulfate, mg/l	13/0	490	547	504
Total Sulfide, mg/l	14/14	<0.005	<0.1	(4)
Calcium, mg/l	13/0	143.7	163	154.0
Magnesium, mg/l	13/0	52.9	61	57.9
Sodium, mg/l	13/0	38	42.3	39.8
Potassium, mg/l	12/0	7.0	8.4	7.8(6)
Carbonate, mg/l	12/12	<1.0	<2.6	(4)
Bicarbonate, mg/l	12/0	152	171	160
Nitrate/Nitrite as N, mg/l	13/0	0.05	1.61	0.80
Nitrite Nitrogen (NO2-N), mg/l	13/12	0.01	0.01	0.09(5)
Nitrate Nitrogen (NO3-N), mg/l	13/0	0.5	1.60	0.80
Total Cyanide, mg/l	13/13	<0.002	<0.02	(4)
Ammonia as N, mg/l	13/12	<0.02	0.15	0.03
Aluminum, Diss., mg/l	13/12	<0.05	0.121	0.059
Antimony, Diss., mg/l	13/13	<0.003	<0.1	(4)
Arsenic, Diss., mg/l	13/3	<0.002	0.0040	0.0033(5)
Barium, Diss., mg/l	13/13	<0.1	<0.1	(4)
Beryllium, Diss., mg/l	13/13	<0.0003	<0.1	(4)
Bismuth, Diss., mg/l	13/13	<0.0001	<0.0005	(4)

Source: Hydro-Geo Consultants, Inc., 1994.

TABLE 2

SUMMARY OF WATER QUALITY
REDLANDS SPRING - SW-1
CANYON RESOURCES CORPORATION
BRIGGS PROJECT
(Period of Record from January, 1993 through February, 1993 (1))

Parameter	Redlands Spring - SW-1			
	Num (2)	Min	Max	Mean (3)
Boron, Diss., mg/l	13/0	0.28	0.36	0.32
Cadmium, Diss., mg/l	13/13	<0.001	<0.005	(4)
Chromium, Diss., mg/l	10/10	<0.01	<0.01	(4)
Trivalent Chromium, mg/l	13/13	<0.01	<0.01	(4)
Hexavalent Chromium, mg/l	13/13	<0.005	<0.01	(4)
Cobalt, Diss., mg/l	13/13	<0.01	<0.01	(4)
Copper, Diss., mg/l	13/13	<0.01	<0.05	(4)
Iron, Diss., mg/l	13/13	<0.05	<0.1	(4)
Lead, Diss., mg/l	13/13	<0.005	<0.005	(4)
Manganese, Diss., mg/l	13/12	<0.01	0.015	0.013(5)
Mercury, Diss., mg/l	13/13	<0.0002	<0.001	(4)
Molybdenum, Diss., mg/l	13/13	<0.01	<0.01	(4)
Nickel, Diss., mg/l	13/13	<0.005	<0.05	(4)
Selenium, Diss., mg/l	13/8	<0.002	0.003	0.002
Silver, Diss., mg/l	13/13	<0.01	<0.01	(4)
Strontium, Diss., mg/l	10/10	1.00	1.2	1.10
Thallium, Diss., mg/l	13/13	<0.001	<0.005	(4)
Vanadium, Diss., mg/l	12/12	<0.01	<0.05	(4)(6)
Zinc, Diss., mg/l	13/13	<0.01	<0.05	(4)
Aluminum, Total, mg/l	5/4	<0.05	0.1	0.06
Antimony, Total, mg/l	5/4	<0.1	0.196	0.119
Arsenic, Total, mg/l	5/1	<0.002	0.0050	0.004
Barium, Total, mg/l	5/5	<0.1	<0.1	(4)
Beryllium, Total, mg/l	5/5	<0.01	<0.01	(4)
Bismuth, Total, mg/l	4/4	<0.0001	<0.0005	(4)
Boron, Total, mg/l	5/0	0.27	0.33	0.30
Cadmium, Total, mg/l	5/5	<0.005	<0.005	(4)
Chromium, Total, mg/l	4/4	<0.01	<0.01	(4)
Cobalt, Total, mg/l	5/5	<0.01	<0.01	(4)
Copper, Total, mg/l	5/4	<0.01	0.01	0.01

Source: Hydro-Geo Consultants, Inc., 1994.

TABLE 2

SUMMARY OF WATER QUALITY
REDLANDS SPRING - SW-1
CANYON RESOURCES CORPORATION
BRIGGS PROJECT
(Period of Record from January, 1993 through February, 1993(1))

Parameter	Redlands Spring - SW-1			
	Num (2)	Min	Max	Mean (3)
Iron, Total, mg/l	5/5	<0.05	<0.05	(4)
Lead, Total, mg/l	5/5	<0.005	<0.005	(4)
Manganese, Total, mg/l	5/5	<0.01	<0.01	(4)
Mercury, Total, mg5/5	5/5	<0.0002	<0.0002	(4)
Molybdenum, Total, mg/l	5/5	<0.01	<0.01	(4)
Nickel, Total, mg/l	5/5	<0.05	<0.05	(4)
Selenium, Total, mg/l	5/3	<0.002	0.0030	0.0023
Silver, Total, mg/l	5/5	<0.01	<0.01	(4)
Strontium, Total, mg/l	4/0	1.04	1.12	1.09
Thallium, Total, mg/l	5/5	<0.005	<0.005	(4)
Vanadium, Total, mg/l	5/5	<0.05	<0.05	(4)
Zinc, Total, mg/l	5/4	<0.01	0.015	0.019(5)

NOTES:
(1) Period of record for table - SW-1: monthly 2/93 through 2/94
(2) Two values are presented: the first value is the total number of samples; the second value is the number of samples with results less than detection limit.
(3) Summary statistics calculated using absolute value of detection limit for any result reported as less than detection limit.
(4) All values less than detection limit.
(5) Maximum detected value noted in this table is less than one of the detection limits for the analyzed parameter. Resulting mean is skewed high.
(6) The record for this parameter, at this station, includes at least one suspected anamolous value. These anamolous data are not included in the statistical analysis, however, are shown separately in Table 3, "Table of Anomolous Water Quality Data".

Source: Hydro-Geo Consultants, Inc., 1994.

APPENDIX E
VEGETATION AND WILDLIFE SPECIES LISTS

TABLE E.1
PLANT SPECIES OBSERVED WITHIN THE BRIGGS PROJECT AREA

SPECIES	HABIT	COMMUNITY TYPES(1)			
		DSS	CBS BS	CBS WC	CBS MS
Amaranthaceae					
Tidestromia oblongifolia	Perennial Herb		X	X	X
Asclepiadaceae					
Sarcostemma hirtellum	Perennial Herb			X	
Asteraceae					
Ambrosia dumosa	Shrub	X	X	X	X
Amphipappus fremontii	Shrub			X	X
Atrichoseris platyphylla	Annual	X	X	X	X
Baccharis sergiloides	Shrub				
Bebbia juncea	Shrub		X	X	X
Brickellia desertorum	Shrub			X	
Brickellia knappiana	Shrub			X	
Brickellia multiflora	Shrub			X	X
Calycoseris parryi	Annual		X		X
Chaenactis carphoclinia var. carphoclinia	Annual	X	X	X	X
Chaenactis fremontii	Annual	X	X		
Chrysothamnus teretifolius	Shrub			X	
Encelia farinosa	Shrub		X	X	X
Eriophyllum ambiguum	Annual		X		X
Eriophyllum wallacei	Annual		X		
Filago depressa	Annual	X	X		X
Geraea canescens	Annual	X	X		X
Gutierrezia microcephala	Shrub			X	X
Lactuca serriola	Annual			X	
Malacothrix coulteri	Annual		X		
Malacothrix glabrata	Annual	X	X		X
Monoptilon bellioides	Annual	X	X		X
Perityle emoryi	Annual		X	X	X
Peucephyllum schottii	Shrub		X	X	X
Pleurocoronis pluriseta (Hormeisteria p.)	Shrub			X	X
Prenanthella exigua (Lygodesmia e.)	Annual		X		X
Psathyrotes ramosissima	Annual	X	X		X
Rafinesquia neomexicana	Annual	X		X	X
Senecio mohavensis	Annual		X	X	X
Stephanomeria exigua	Annual	X			
Stephanomeria pauciflora var. pauciflora	Shrub		X	X	X
Stylocline micropoides	Annual				X
Stylocline psilocarphoides	Annual			X	
Syntrichopappus fremontii	Annual			X	
Uropappus lindleyi (Microseris linearifolia)	Annual			X	
Viguiera reticulata	Shrub		X	X	X
Xylorpiza tortifolia var. t. (Machaeranthera t.)	Shrub			X	X
Boraginaceae					
Amsinckia tessellata	Annual			X	X
Cryptantha angustifolia	Annual	X	X	X	X
Cryptantha decipiens	Annual			X	
Cryptantha maritima	Annual				X
Cryptantha micrantha	Annual		X		
Cryptantha nevadensis	Annual	X	X	X	X
Cryptantha pterocarya	Annual			X	X
Cryptantha racemosa	Perennial Herb			X	X
Cryptantha utahensis	Annual			X	X
Pectocarya heterocarpa	Annual	X	X		
Pectocarya platycarpa	Annual			X	X
Pectocarya recurvata	Annual	X	X	X	X
Plagiobothrys jonesii	Annual				X
Brassicaceae					
Guillenia lasiophylla (Thelypodium l.)	Annual	X	X	X	X
Lepidium fremontii	Shrub			X	X
Lepidium lasiocarpum var. lasiocarpum	Annual	X	X	X	X
Sisymbrium irio	Annual	X	X		

Source: Bagley, 1993; Nomenclature follows Hickman, 1993.

(1) Community types: DSS = desert sink scrub; CBS = Mojave creosote bush scrub; BS = on bajada slopes; WC = in washes and canyon bottoms; MS = on mountain slopes.

TABLE E.1

PLANT SPECIES OBSERVED WITHIN THE BRIGGS PROJECT AREA[1]

(Continued)

SPECIES	HABIT	COMMUNITY TYPES[1]			
		DSS	CBS BS	CBS WC	CBS MS
Cactaceae					
Echinocactus polycephalus var. polycephalus	Succulent		X		X
Echinocactus englemannii	Succulent				X
Ferocactus cylindraceus (F. acanthodes)	Succulent				X
Mammillaria tetrancistra	Succulent		X	X	X
Opuntia basilaris var. basilaris	Succulent		X		X
Campanulaceae					
Nemaciadus sp.	Annual	X	X		X
Chenopodiaceae					
~~*Allenrifea*~~ *Allenrolfea occidentalis*	Shrub	X			
Atriplex hymenelytra	Shrub	X	X	X	X
Atriplex polycarpa	Shrub	X	X		
Chenopodium sp.	Annual		X		
Grayia spinosa	Shrub				X
Kochia americana	Shrub	X			
Salicornia utahensis	Herb	X			
Salsola sp.	Annual		X		
Suaeda moquinii (S. torreyana, S. fruticosa)	Shrub	X	X		
Cucurbitaceae					
Cucurbita palmata	Perennial Herb			X	
Cuscutaceae					
Cuscuta sp.	Annual	X	X	X	X
Euphorbiaceae					
Chamaesyce micromera (Euphorbia m.)	Annual		X		X
Fabaceae					
Proposis grandulosa var. torreyana	Tree		X		
Dalea mollissima	Perennial Herb	X	X		X
Hydrophyllaceae					
Eucrypta chrysanthemifolia var. bipinnatifida	Annual				X
Eucrypta micrantha	Annual			X	X
Nama pusillum	Annual	X			
Phacelia calthifolia	Annual			X	X
Phacelia crenulata	Annual		X	X	X
Phacelia pedicellata	Annual		X	X	
Phacelia perityloides	Annual			X	
Juncaceae					
Juncus cooperi	Herb	X			
Loasaceae					
Eucnide urens	Perennial Herb		X	X	X
Mentzelia reflexa	Annual				
Mentzelia sp.	Annual		X		X
Malvaceae					
Eremalche rotundifolia	Annual	X			X
Sphaeralcea ambigua var. ambigua	Perennial Herb			X	X
Onagraceae					
Camissonia boothii	Annual	X	X		
Camissonia brevipes	Annual	X			X
Camissonia cardiophylla	Annual		X	X	X
Camissonia claviformis	Annual	X	X	X	
Camissonia refracta	Annual	X	X	X	X
Papaveraceae					
Argemone sp.	Perennial Herb			X	X
Eschscholzia minutiflora	Annual		X	X	
Plantaginaceae					
Plantago ovata (P. insularis var. *fastigiata)*	Annual	X	X		X

Source: Bagley, 1993; Nomenclature follows Hickman, 1993.

(1) Community types: DSS = desert sink scrub; CBS = Mojave creosote bush scrub; BS = on bajada slopes; WC = in washes and canyon bottoms; MS = on mountain slopes.

TABLE E.1

PLANT SPECIES OBSERVED WITHIN THE BRIGGS PROJECT AREA[1]

(Continued)

SPECIES	HABIT	COMMUNITY TYPES[1]			
		DSS	CBS BS	CBS WC	CBS MS
Poaceae					
Achnatherum speciosa (Stipa s.)	Perennial Herb			X	X
Aristida purpurea var. nealleyi (A. giauca)	Perennial Herb			X	
Bromus madritensis ssp. rubens (B. rubens)	Annual		X	X	X
Bromus tectorum	Annual	X			X
Bromus trinii	Annual			X	X
Distichlis spicata	Perennial Herb	X			
Erioneuron pulchellum	Perennial Herb				X
Poa bigelovii	Annual			X	
Poa secunda	Perennial Herb				X
Schismus arabicus	Annual	X	X		X
Vulpia octoflora (Festuca o.)	Annual		X	X	X
Polemoniaceae					
Gilia filiformis	Annual		X		X
Gilia latifolia	Annual	X	X	X	X
Gilia sp.	Annual		X	X	X
Langloisia setosissima var. punctata (L. punctata)	Annual	X	X		X
Polygonaceae					
Chorizanthe brevicornu	Annual	X	X	X	X
Chorizanthe rigida	Annual	X	X	X	X
Eriogonum detlexum	Annual		X		
Eriogonum fasciculatum ssp. polifolium	Shrub		X		X
Eriogonum glandulosum	Annual				X
Eriogonum nidularium	Annual				X
Eriogonum reniforme	Annual	X	X		
Erogonum rixfordii	Annual			X	X
Eriogonum thomasii	Annual	X	X		X
Oxytheca perfoliata	Annual				X
Pterostegia drymarioides	Annual				X
Pteridaceae					
Cheilanthes parryi	Perennial Herb				X
Ranunculaceae					
Delphinium parishii ssp. parishii	Perennial Herb				X
Resedaceae					
Oligomeris linifolia	Annual	X	X		X
Rubiaceae					
Galium stellatum var. eremicum	Perennial Herb			X	X
Scrophulariaceae					
Mimulus bigelovii	Annual	X			
Mohavea breviflora	Annual		X	X	X
Solanaceae					
Datura wrightii (D. meteloides)	Perennial Herb		X	X	X
Lycium andersonii	Shrub				X
Nicotiana obtusifolia (N. trigonophylla)	Perennial Herb			X	X
Physalis crassifolia	Perennial Herb		X	X	X
Tamaricaceae					
Tamarix ramosissima	Tree		X		
Urticaceae					
Parietaria hespera var. hespera (P. floridana)	Annual			X	
Zygophyllaceae					
Larrea tridentata	Perennial Shrub		X	X	X

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Source: Bagley, 1993; Nomenclature follows Hickman, 1993.

(1) Community types: DSS = desert sink scrub; CBS = Mojave creosote bush scrub; BS = on bajada slopes; WC = in washes and canyon bottoms; MS = on mountain slopes.

TABLE E.2

PLANT SPECIES OBSERVED AT PROPOSED MICROWAVE STATION SITE

SCIENTIFIC NAME	COMMON NAME	HABIT[1]	OCCURRENCE[2]	
			Microwave Site	Access Route
Asteraceae				
Ambrosia dumosa	Burro-bush	S	X	X
Bebbia juncea	Sweetbush	S	X	
Chaenactis carphoclinia var. *carphoclinia*	Pebble pincushion	A	X	X
Chrysothamnus teretifolius	Green rabbitbrush	S	X	X
Malacothrix coulteri	Snake's-head	A	X	X
Malacothrix glabrata	Desert dandelion	A	X	X
Stephanomeria pauciflora var. *pauciflora*	Desert milk-aster	PH	X	X
Xylorhiza tortilfolia var. *tortifolia*	Mojave aster	PH		X
Boraginaceae				
Amsinckia tessellata var. *tessellata*	Fiddleneck	A	X	X
Cryptantha pterocarya	Wing-nut forget-me-not	A	X	X
Cactaceae				
Echinocactus polycephalus var. *polycephalus*	Cottontop cactus	Suc		X
Chenopodiaceae				
Atriplex confertifolia	Shadscale	S	X	X
Grayia spinosa	Spiny hop-sage	S		X
Ephedraceae				
Ephedra nevadensis	Nevada ~~ephedra~~ Mormon tea	X		X
Fabaceae				
Psorothamnus arborescens var. *minutifolia*	Indigo bush	S	X	X
Geraniaceae				
Erodium cicutarium	Red-stemmed filaree	A	X	X
Hydrophyllaceae				
Phacelia sp.	Phacelia	A	X	X
Nyctaginaceae				
Mirabilis bigelovii	Wishbone bush	PH	X	X
Poaceae				
Achnatherum speciosum	Desert needlegrass	PH	X	X
Bromus madritensis ssp. *rubens*	Red brome	A	X	X
Schismus arabicus	Arabian schismus	A	X	X
Polemoniaceae				
Gilia sp.	Gilia	A	X	X
Polygonaceae				
Eriogonum deflexum var. *deflexum*	Skeleton weed	A		X
Eriogonum fasciculatum var. *polifolium*	California buckwheat	S	X	X
Eriogonum inflatum var. *inflatum*	Desert trumpet	PH	X	X
Eriogonum nidularium	Bird's-nest buckwheat	A	X	X
Oxytheca perfoliata	Saucer plant	A		X
Zygophyllaceae				
Larrea tridentata	Creosote bush	S	X	X

92-274 (4/27/95/rb)

Source: EremiCo, 1993b.

(1) Habit: A = annual; PH = perennial herb; S = shrub; Suc = succulent.
(2) Occurrence: Plants observed on microwave station site and along access route.

TABLE E.3

SENSITIVE PLANT SPECIES OCCURRING OR WITH ~~SOME~~ POTENTIAL TO OCCUR IN THE BRIGGS PROJECT AREA

SCIENTIFIC/COMMON NAME/ (PLANT FAMILY)/LIFE FORM	RANK OR STATUS[1]				FLOWERING PERIOD/COLOR	KNOWN LOCATIONS IN OR NEAREST TO PROJECT AREA	SPECIES[2] OBSERVED	LOCATION/NUMBERS ONSITE
	FWS	DFG	CNDDB	CNPS				
**Brickellia knappiana* Knapp's brickellia/(Asteraceae)/shrub	C3b	–	S?	3	Sept. - Oct. white to light pink	Pleasant Canyon, Panamint Mts.	*	Single individual occurred in Redlands Canyon at base of north facing wall, approximately at eastern boundary at site.
Cryptantha holoptera/winged cryptantha (Boraginaceae)/annual	–	–	S?	4	Mar. - Oct. white	Surprise Canyon, Panamint Mts.	–	–
Dudleya saxosa ssp. *saxosa*/Panamint Dudleya/Crassulacaea/leaf succulent perennial	C3c	–	S?	4	May - June yellow, turning reddish	Arrastre Spring, Panamint Mts.	–	–
Enceliopsis covillei/Panamint daisy (Asteraceae)/herbaceous perennial	C2	–	S2.2	1B	Mar. - Apr. yellow	Surprise Canyon, Panamint Mts.	–	–
Eriogonum hoffmannii var. *hoffmannii*// (Polygonaceae)/annual	C3c	–	S?	4	July - Nov. pink to wine-red	Wildrose Canyon, Panamint Mts.	–	–
Eriogonum hoffmannii var. *robustius*/ (Polygonaceae)/annual	C3c	–	S?	4	Aug. - Nov. pink to wine-red	Emigrant Canyon, Panamint Mts.	–	–
**Ferocactus cylindraceus* var. *cylindraceus* (*F. acanthodes* var. *a.*)/California barrel cactus/ (Cactaceae)/stem succulent perennial	C3c	–	–	3	Apr. - May yellow	Panamint Mts., south of site	*	At least 164 individuals observed on steep rocky slopes, primarily along east site boundary.
Linanthus arenicola/sand linanthus/ (Polemoniaceae)/annual	–	–	S?	2	Mar. - May, ochroleucous, with purplish throat	About one mile north of Wingate Pass, Panamint Mts.	–	–
Petalonyx thurberi ssp. *gilmanii*/Death Valley sandpaper plant/(Loasaceae)/shrub	C2	–	S2.3	1B	May - June into Nov. cream	Near jct. of Trona Hwy. and Indian Ranch Rd., Panamint Valley	–	–

Source: Bagley, 1993.

(1) Rank or status abbreviations:

FWS listings under the ESA: C1 - candidate species, enough data are on file to support proposals to list; C2 - candidate species, vulnerable but not enough data to support listing at this time; and C3b and C3c - noncandidate species, no longer under consideration, because not considered a valid species (b); or too abundant or widespread and/or not threatened at this time (c).

DFG listings are: E - endangered, R - rare under the California Native Plant Protection Act and CESA; CP - species is identified under provisions requiring a permit in order to harvest for horticultural purposes under the California Desert Plant Protection Act.

CNDDB ranks are: S1 - extremely endangered; S2 - endangered; S3 - restricted range, rare; S4 - apparently secure; S5 - demonstrably secure. A more precise degree of threat is sometimes expressed by a decimal followed by a number. The possible range of values is 1-3 with 1 signifying the most threatened and 3 the least threatened. Example: A species ranked S2.1 is endangered and extremely threatened in California.

CNPS ranks are: 1A - plant presumed extinct in California; 1B - plants rare and endangered in California and elsewhere; 2 - plants rare, threatened, or endangered in California, but more common elsewhere; 3 - plants about which we need more information - a review list; and 4 - plants of limited distribution - a watch list.

(2) * = Observed.
-- = Not observed.

TABLE E.3

SENSITIVE PLANT SPECIES OCCURRING OR WITH ~~SOME~~ POTENTIAL TO OCCUR IN THE BRIGGS PROJECT AREA
(Continued)

SCIENTIFIC/COMMON NAME/ (PLANT FAMILY)/LIFE FORM	RANK OR STATUS[1]				FLOWERING PERIOD/COLOR	KNOWN LOCATIONS IN OR NEAREST TO PROJECT AREA	SPECIES[2] OBSERVED	LOCATION/NUMBERS ONSITE
	FWS	DFG	NDDB	CNPS				
Phacelia mustelina/Death Valley round-leaved phacelia/(Hydrophyllaceae)/annual	–	–	S?	1B	Apr. - June violet	Surprise Canyon, Panamint Mts.	–	–
Scleocactus polyancistrus/Mojave fish-hook cactus/(Cactaceae)/stem succulent perennial	–	CP	S?	4	Apr. - June magenta	Gold Hill and Warm Spring/Galena Canyon area, Panamint Mts.	–	–
Limestone or dolomite endemics								
Arctomecon merriami/white bear poppy/ (Papaveraceae)/herbaceous perennial	C2	–	S3.3	2	Apr. - May white	Tetracoccus Ridge, Panamint Mts.	–	–
Eriogonum intrafractum/jointed buckwheat/ (Polygonaceae)/herbaceous perennial	C3c	–	S?	4	May - Oct. yellow	Death Valley Canyon, Panamint Mts.	–	–
Gilia ripleyi/Ripley's gilia/(Polemoniaceae)/ herbaceous perennial	C3c	–	S?	2	May - Oct. pink	Johnson Canyon, Panamint Mts.	–	–
Mimulus rupicola/rock-midget/ (Scrophulariaceae)/annual	C3c	–	S3?	4	Mar. - May pink with purple spot on lobes	Bendire Canyon, Argus Mts.	–	–
Salvia funerea/Death Valley sage/ (Lamiaceae)/ shrub	C3c	–	S?	4	Mar. - May violet	Trail Canyon, Panamint Mts.	–	–
Selaginella leucobryoides/Mojave spike-moss/ (Selaginellaceae)/herbaceous perennial	–	–	S1.3	4	No flowers (spore-bearing)	Telescope Peak trail, Panamint Mts.	–	–
Tetracoccus ilicifolius/holly-leaved tetracoccus/(Euphorbiaceae)/shrub	C3c	–	S1.3	1B	May - June brownish (no petals)	Death Valley Canyon, Panamint Mts.	–	–

92-274 (4/27/95/rb)

Source: Bagley, 1993.

(1) Rank or status abbreviations:

FWS listings under the ESA: C1 - candidate species, enough data are on file to support proposals to list; C2 - candidate species, vulnerable but not enough data to support listing at this time; and C3b and C3c - noncandidate species, no longer under consideration, because not considered a valid species (b); or too abundant or widespread and/or not threatened at this time (c).

DFG listings are: E - endangered, R - rare under the California Native Plant Protection Act and CESA; CP - species is identified under provisions requiring a permit in order to harvest for horticultural purposes under the California Desert Plant Protection Act.

CNDDB ranks are: S1 - extremely endangered; S2 - endangered; S3 - restricted range, rare; S4 - apparently secure; S5 - demonstrably secure. A more precise degree of threat is sometimes expressed by a decimal followed by a number. The possible range of values is 1-3 with 1 signifying the most threatened and 3 the least threatened. Example: A species ranked S2.1 is endangered and extremely threatened in California.

CNPS ranks are: 1A - plant presumed extinct in California; 1B - plants rare and endangered in California and elsewhere; 2 - plants rare, threatened, or endangered in California, but more common elsewhere; 3 - plants about which we need more information - a review list; and 4 - plants of limited distribution - a watch list.

(2) * = Observed.
-- = Not observed.

TABLE E.4

REPTILES OBSERVED OR EXPECTED TO OCCUR IN THE BRIGGS PROJECT AREA

SCIENTIFIC NAME	COMMON NAME	SURVEY OBSERVED (see footnotes)
Gopherus agassizii	Desert tortoise	--
Dipsosuarus dorsalis	Desert iguana	1,3
Crotophytus wislizenii	Leopard lizard	1,3
Sceloporus occidentalis	Fence lizard	1
Phrynosoma playtyrhinos	Desert horned lizard	2,3
Uta stansburiana	Side-blotched lizard	1,2,3,4
Cnemidophorus tigris tigris	~~Western whiptail lizard~~ Great Basin whiptail	1,2,3
Callisaurus draconoides	Zebra-tailed lizard	1,2,3
Pituophis melanoleucus	Gopher snake	--
Lampropeltis getulus	Kingsnake	--
Masticophis flagellum	Coachwhip	--
Crotalus cerastes	Sidewinder	1,3
Crotalus mitchelli stephensi	Panamint speckled rattlesnake	2,3
Crotalus mitchelli	Speckled rattlesnake	--
Crotaphytus collaris	Collared lizard	--
Sceloporus magister	Desert spiny lizard	--
Urosaurus graciosus	Western brush lizard	--
Gerrhonotus panamintinus	Panamint alligator lizard	--
Eumeces gilberti	Gilbert's skink	--
Leptotyphlops humilis	Western blind snake	--
Lichanura trivigata	Rosy boa	--
Phyllorhynchus decurtatus	Leaf-nosed snake	--
Masticophis taeniatus	Striped racer	--
Arizona elegans	Desert glossy snake	--
Lampropeltis getulus	Common kingsnake	--
Rhinocheilus lecontei	Long-nosed snake	--
Chionactis occipitalis	Shovel-nosed snake	--
Sonora semiannulata	Western ground snake	--
Tantilla planiceps	Black-headed snake	--
Trimorphodon vandenburghi	California lyre snake	--
Hypsiglena otrquata	Desert night snake	--
~~*Sauromalis*~~ *Sauromalius obesus obesus*	Chuckwalla	2
Coleonyx varieratus varieratus ~~*vareratus*~~	Desert banded gecko	2
Salvadora hexalepis hexalepis	Desert patch-nosed snake	2

92-274 (4/27/95/rb)

(1) Brown, 1989.
(2) JBR, 1991.
(3) NECI, 1992.
(4) EremiCo, 1993a; 1993b.

TABLE E.5

BIRD SPECIES OBSERVED OR EXPECTED TO OCCUR IN THE BRIGGS PROJECT AREA

SPECIES	SURVEY OBSERVED (see footnotes)
Turkey Vulture	1,2,3
Golden Eagle	
Northern Harrier	
Sharp-skinned Hawk	
Cooper's Hawk	
Red-tailed Hawk	1,3,4,5
Rough-legged Hawk	
Ferruginous Hawk	2
American Kestrel	1,3,8
Prairie Falcon	8
Gambel's Quail	3
Mountain Quail	
Band-tailed Pigeon	
Mourning Dove	1,2,3,8
Greater Roadrunner	
Common Barn Owl	
Short-eared Owl	
Long-eared Owl	
Great Horned Owl	
Burrowing Owl	6
Common Poorwill	2,8
Lesser Nighthawk	
White-throated Swift	1,2,3,8
Black-chinned Hummingbird	
Costa's Hummingbird	1*,3
Anna's Hummingbird	3
Western Kingbird	1,2,3,8
Ash-throated Flycatcher	2,3,8
Dusky Flycatcher	1

(1) JBR, 1991.
(2) Brown, LeBerteaux, 1989.
(3) LeBerteaux, 1993.
(4) NECI, 1992a; 1992b.
(5) EremiCo, 1993b.
(6) EremiCo, 1993a.
(7) West Mojave Coordinated Management Plan Survey.
(8) EremiCo, 1994.

*Sighted off-property (Redlands Spring)

TABLE E.5

BIRD SPECIES OBSERVED OR EXPECTED TO OCCUR IN THE BRIGGS PROJECT AREA
(Continued)

SPECIES	SURVEY OBSERVED (see footnotes)
Western Wood-Pewee	2,3,8
Say's Phoebe	1,2,3,8
Willow Flycatcher	
Gray Flycatcher	
Empidonax Flycatcher Sp.	1*,2
Horned Lark	3
Violet-green Swallow	1,2,8
Northern Rough-winged Swallow	1,8
Cliff Swallow	1,2,3,8
Barn Swallow	1,3,8
Common Raven	1,2,3,4,8
Verdin	3,8
Bushtit	
House Wren	1
Bewick's Wren	
Canyon Wren	1
Singing Rock Wren	1,3
Golden-crowned Kinglet	
Ruby-crowned Kinglet	1
Blue-gray Gnatcatcher	1,2,3,8
Black-tailed Gnatcatcher	1
Townsend's Solitaire	
Hermit Thrush	1,2,3
Varied Thrush	
American Robin	
Loggerhead Shrike	
Northern Mockingbird	2,3,8
Le Conte's Thrasher	3
Cedar Waxwing	
Phainopepla	2,3

(1) JBR, 1991.
(2) Brown, LeBerteaux, 1989.
(3) LeBerteaux, 1993.
(4) NECI, 1992a; 1992b.
(5) EremiCo, 1993b.
(6) EremiCo, 1993a.
(7) West Mojave Coordinated Management Plan Survey.
(8) EremiCo, 1994.

*Sighted off-property (Redlands Spring)

TABLE E.5

BIRD SPECIES OBSERVED OR EXPECTED TO OCCUR IN THE BRIGGS PROJECT AREA
(Continued)

SPECIES	SURVEY OBSERVED (see footnotes)
European Starling	2,3
Solitary Vireo	2
Warbling Vireo	2
Orange-crowned Warbler	2,3
Nashville Warbler	1*
Virginia's Warbler	
Yellow-~~rumped~~ Warbler	1,3
Black-throated Gray Warbler	
Townsend's Warbler	3
Yellow Warbler	1,2,3
Macgillivray's Warbler	
Canada Warbler	2
Wilson's Warbler	1,2,3,8
Yellow-breasted Chat	
Black-headed Grosbeak	2
Lazuli Bunting	
Rufou-sided Towhee	
Song Sparrow	
Black-throated Sparrow	1,2,3,5
Sage Sparrow	4
Chipping Sparrow	1
Brewer's Sparrow	1
Black-chinned Sparrow	
Dark-eyed Junco	
White-crowned Sparrow	1,2
Golden-crowned Sparrow	
Fox Sparrow	
Song Sparrow	1*
Brown-headed Cowbird	1,2,3,8

(1) JBR, 1991.
(2) Brown, LeBerteaux, 1989.
(3) LeBerteaux, 1993.
(4) NECI, 1992a; 1992b.
(5) EremiCo, 1993b.
(6) EremiCo, 1993a.
(7) West Mojave Coordinated Management Plan Survey.
(8) EremiCo, 1994.

*Sighted off-property (Redlands Spring)

TABLE E.5

BIRD SPECIES OBSERVED OR EXPECTED TO OCCUR IN THE BRIGGS PROJECT AREA
(Continued)

SPECIES	SURVEY OBSERVED (see footnotes)
Great-tailed Grackle	2
Northern Oriole	1,2,3,8
Scotts Oriole	3
Western Tanager	1,2,3,8
House Sparrow	2,3
Lesser Goldfinch	1,2,3
House Finch	1,2,3,8
Belted Kingfisher	3
Northern Flicker	3
Olive-sided Flycatcher	3
Northern Rough-winged Swallow	3
Black-headed Grosbeak	3
Brewer's Blackbird	1,3
~~Cinnamon Teal~~	~~1~~
Peep, Sp.	1
Loggerhead Shrike	5
Cinnamon Teal	1,7
Redheads	7
Buffleheads	7
Snowy ~~Plovers~~ Plover	--
Least ~~Sandpipers~~ Sandpiper	7, 9
Olive-sided Flycatcher	8
Flycatcher sp.	8
Common Yellowthroat	8
Indigo Bunting	8
Western Meadowlark	8
Yellow-headed Blackbird	8
Black-necked stilt	9
American avocet	9

92-274 (4/27/95/rb)

(1) JBR, 1991.
(2) Brown, LeBerteaux, 1989.
(3) LeBerteaux, 1993.
(4) NECI, 1992a; 1992b.
(5) EremiCo, 1993b.
(6) EremiCo, 1993a.
(7) West Mojave Coordinated Management Plan Survey.
(8) EremiCo, 1994.
(9) EremiCo, 1993c

*Sighted off-property (Redlands Spring)

TABLE E.6

MAMMALS OBSERVED OR EXPECTED TO OCCUR IN THE BRIGGS PROJECT AREA*

SCIENTIFIC NAME	COMMON NAME	SURVEY OBSERVED (see footnotes)
Sylvilagus auduboni	Cottontail rabbit	--
Lepus californicus	Jack rabbit	1,2,3
Lepus californicus	Black-tailed hare	2
Ammospermophilus leucurus	Whitetail antelope squirrel	1,3
Chaetodipus formosus	Long-tailed pocket mouse	1,2
Perognathus longimembris	Little pocket mouse	1,3
Chaetodipus penicillatus	Desert pocket mouse	3
Dipodomys deserti	Desert kangaroo rat	1,3
Dipodomys merriami	Merriam kangaroo rat	1,3
Peromyscus crinitus	Canyon mouse	1,3
Peromyscus maniculatus	Deer mouse	1,2,3
? Spermophilus mohavensis	Mojave ground squirrel	--
Thomomys umbrinus	Panamint pocket gopher	--
Thomomys bottae	Botta pocket gopher	--
Perognathus parvus	Great Basin pocket mouse	--
Dipodomys panamintinus	Panamint kangaroo rat	--
Dipodomys microps	Chisel-toothed kangaroo rat	--
Dipodomys sp.	Kangaroo rat	4
Onychomys torridus	Grasshopper mouse	--
Peromyscus eremicus	Cactus mouse	--
Peromyscus boylii	Brush mouse	--
Reithrodontomys megalotis	Harvest mouse	--
Neotoma fuscipes	Dusky-footed woodrat	--
Erethizon dorsatim	Porcupine	--
? Neotoma lepida	Desert woodrat	1,3,4 (scat)
Bassariscus astutus	Ringtail cat	1 (scat), 3
Canis latrans	Coyote	1 (prints), 2 (tracks, digging, scat), 3

(1) Brown, 1989.
(2) JBR, 1991.
(3) NECI, 1992a; 1992b.
(4) EremiCo, 1993b.

* Based on known range and preferred habitat - "?" in left column designates question as to whether species would be expected.

TABLE E.6

MAMMALS OBSERVED OR EXPECTED TO OCCUR IN THE BRIGGS PROJECT AREA*
(Continued)

SCIENTIFIC NAME	COMMON NAME	SURVEY OBSERVED (see footnotes)
Vulpes macrotis	Desert kit fox	1 (prints), 2 (tracks, digging, scat), 4 (burrow) 3
Lynx rufus	Bobcat	1 (prints), 3
Felis concolor	Mountain lion	2 (tracks), 3
Ovis canadensis nelsoniai	Nelson's bighorn sheep	1, 2 (droppings, skeletal remains), 3, 4 (tracks)
Spilogale putorius	Spotted skunk	--
Taxidea taxus	Badger	2 (digging)
Odocoileus hemionus	Mule deer	--
Equus asinus	Wild (Feral) Burro	2 (droppings, skeletal remains, auditory detection)
Myotis californicus	California myotis bat	1
Pipistrellus hesperus	Western pipestrelle	1
Antrozous pallidus	Pallid bat	1
Plecotus townsendii	Townsend's big-eared bat	1
Myotis yumanensis	Yuma myotis	--
Myotis volans	Long-legged myotis	--
Myotis leibii	Small-footed myotis	--
Myotis thysanodes	Fringed myotis	--
Eptesicus fuscus	Big brown bat	--
Tadarida brasiliensis	Mexican free-tailed bat	--
Lasionyeteris noctiragans	Silver-haired bat (migrant)	--
Lasiurus cinereus	Hoary bat (migrant)	--

92-274 (7/11/94/ds)

(1) Brown, 1989.
(2) JBR, 1991.
(3) NECI, 1992a; 1992b.
(4) EremiCo, 1993a; 1993b.

* Based on known range and preferred habitat

APPENDIX F
DRAFT MITIGATION MONITORING PLAN

92-274

BRIGGS PROJECT
INYO COUNTY, CALIFORNIA

DRAFT
MITIGATION MONITORING PLAN
State Clearinghouse No. 92122070

September 1994
(Revision 4)

Prepared for:

Bureau of Land Management
Ridgecrest Resource Area
Ridgecrest, California

County of Inyo
Planning Department
Independence, California

1.0 INTRODUCTION

1.1 BACKGROUND

1. This Draft Mitigation Monitoring Plan (Plan) for the Briggs Project has been prepared to comply with Public Resources Code Section 21081.6 of the California Environmental Quality Act (CEQA) and Part 40 Code of Federal Regulations (CFR) Section 1502.2c of the federal Council on Environmental Quality (CEQ) regulations. Section 21081.6 of CEQA requires that public agencies adopt a monitoring program for the measures included as part of the proposed project to mitigate or avoid significant effects to the environment. The monitoring program is required to assure compliance with the various mitigation measures adopted through the CEQA process. CEQ regulations require that a monitoring and enforcement program for mitigation measures be adopted by public agencies where applicable.

2. This Draft Plan includes the mitigation measures included in the Draft Environmental Impact Statement/Environmental Impact Report (EIS/EIR) for the Briggs Project. The final Plan, including any mitigations that may be developed pursuant to the Final EIS/EIR, will be adopted by Inyo County (County) in conjunction with issuance of a Reclamation Permit. The final Plan will be adopted by the Bureau of Land Management (BLM) in conjunction with a Record of Decision for issuance of a Plan of Operations. In addition, the Plan will be amended on an as-needed basis to include conditions of approval that may be stipulated with project-related permits that will be issued by other public agencies. As deemed appropriate by the County and BLM, the conditions of approval included in other permits would be included in an amended Plan.

1.2 PLAN FORMAT

1. Mitigation measures in this Plan are tabulated in Chapter 2.0, grouped by environmental topic (i.e., topography, geology and soils, waters resources, etc.) corresponding to sections in Chapter 4.0 of the Draft EIS/EIR.

2. The following are included for each mitigation measure:
   - **Implementation Responsibility:** Identifies the party responsible for implementing the mitigation measure. For the most part, implementation of mitigation measures included in this Plan is the responsibility of CR Briggs Corporation a subsidiary of Canyon Resources Corporation (collectively, Canyon) or successors of interest.
   - **Effectiveness:** Identifies the effect of the mitigation measure that is expected.

- **Standard of Compliance:** Delineates criteria for determining compliance with the mitigation measure.
- **Monitoring:** Describes the role and action to be performed to oversee, review, and/or monitor the implementation of the mitigation measure.

Implementation schedules (e.g., construction phase, operations phase, etc.) for each mitigation measure are provided within the text of the mitigation measure and/or with the standard of compliance.

1.3 RESPONSIBILITIES OF THE INVOLVED PARTIES

1. Canyon and its construction contractors must fully comply with the conditions and measures described in this Plan. If the described measures are not implemented, the County and/or the BLM have the authority to revoke permits granted.

2. Canyon would be responsible for preparing a brief Environmental Compliance Report upon completion of construction-related mitigation monitoring activities, and would forward copies of the report to the County and BLM for their records. This report would provide a summary of the efforts of Canyon and its construction contractors to comply with the Plan. Periodic Environmental Compliance Reports would also be submitted during operations, and upon completion of final reclamation measures.

3. Enforcement responsibilities for each mitigation measure would vary depending upon the agency or agencies designated as being responsible for implementation and/or monitoring. Methods for enforcement of mitigation measures, resolution of conflicts, and notification of violations would also vary depending on the designated responsible agency. Enforcement measures may include written notification to the project applicant of noncompliance, fines levied for exceedance of specified environmental standards (e.g., air emissions or wastewater discharges), and/or suspension of activities that may affect endangered species.

1.4 IMPLEMENTATION PROCEDURES

1. The primary means for documenting monitoring activities for this Plan would be written environmental compliance reporting. Other documentation, such as memoranda and field logs, may also be generated and compiled. The compliance reporting system would document both compliance and noncompliance with mitigation, conditions, and other project requirements. A consistent form may be developed to document observations. The form

would contain information needed for weekly, monthly, and/or annual summaries of compliance status. The compliance reports would be intended as an individual, auditable record of a specific observation. Separate reports would be filed for construction activity and ongoing project operations when requested by the agency.

2.0 MITIGATION MONITORING PLAN

MITIGATION MEASURES[1]	IMPLEMENTATION RESPONSIBILITY	EFFECTIVENESS	STANDARD OF COMPLIANCE	MONITORING
Topography, Geology, and Soils				
1. Site roads shall be constructed to follow existing contours, where possible, to minimize topographic changes due to grading.	Canyon	Minimizes topographic changes due to grading.	For any site roads that require more than 5 feet of cut or fill averaged over the width of the road for any 1,000-foot segment located outside the footprint of the final mine pit, waste rock piles or heap leach pile, Canyon shall submit a specific grading plan to BLM prior to construction of the road, and gain BLM concurrence that the proposed grading is not more than necessary for efficient operations.	BLM will observe grading at site roads during quarterly site inspections.
2. For areas where cut and fill construction is required, excavated material shall be reworked into cut areas during reclamation to blend the surface with surrounding natural contours.	Canyon	Provides some blending of the surface with surrounding natural contours.	Regrading shall occur to the extent required to blend surface contours. BLM or the County may require up to 50 percent of the fill material to be reworked in order to blend with surrounding contours to the extent practical.	The County and BLM will inspect regraded areas prior to release of financial assurance for regrading activities.
3. The process water ponds area shall be graded during reclamation to drain freely and blend with surrounding topography.	Canyon	Enables these areas to drain freely and blend with surrounding topography.	Regrading shall blend final pond surface contours to a natural configuration that allows free surface drainage.	The County and BLM will inspect regraded areas prior to release of financial assurance for regrading activities.
4. The borrow area shall be reclaimed to provide low slope angles (5H:1V). If the onsite borrow area is used, the area shall be graded to drain freely when borrow activities are completed. If necessary to establish free drainage, waste rock shall be used for fill material.	Canyon	Provides free drainage and safe stable slopes.	The borrow area shall be reclaimed with maximum 5H:1V slopes. Regrading of slopes shall not result in additional surface disturbance. Except for microcatchments to enhance revegetation, the onsite borrow area, if used, shall be reclaimed to drain freely. The 5H:1V slope angles shall be provided within 90 days of completing each borrow phase. For the onsite borrow location, free drainage shall be restored within 90 days of completing the final phase of borrow activity.	The County and BLM will inspect regraded areas prior to release of financial assurance for regrading activities.

(1) Includes regulatory requirements that specifically limit project impacts.

MITIGATION MEASURES[1]	IMPLEMENTATION RESPONSIBILITY	EFFECTIVENESS	STANDARD OF COMPLIANCE	MONITORING
Topography, Geology, and Soils (Cont'd)				
5. Leach pad slopes shall be constructed at overall slopes of about 2.5H:1V or less with benches for stability.	Canyon	Provides stability in the event of ground motion from earthquakes.	Perimeter slopes shall have a maximum overall slope of 2.5H:1V.	The Regional Water Quality Control Board (RWQCB) will perform routine site inspections to assure compliance.
6. Heap leach pile slopes shall be regraded to overall 3H:1V during reclamation.	Canyon	Breaks up the straight-line, man-made appearance and provides a stable natural slope angle.	Overall slope angle shall be 3H:1V or less and a maximum slope of 1.5H:1V shall not exceed one-third of the leach pile height.	The County and BLM will inspect regraded areas prior to release of financial assurance for regrading activities.
7. Waste rock piles shall be constructed with overall slope angles of 2.5H:1V or less to provide stability. Benches shall be included at regular intervals to catch minor raveling.	Canyon	Provides stable pile configuration.	Overall slope angles shall not exceed 2.5H:1V. Minimum factor of safety shall not be less than specified in the EIS/EIR.	Topographic maps showing waste rock pile slope angles shall be provided to BLM annually. When mining is completed, Canyon shall provide the County and BLM with engineering data documenting slope stability and the estimated factor of safety.
8. During final site operations and/or reclamation, grading shall occur to break up the straight-line man-made appearance of the waste rock piles.	Canyon	Reduces visual contrast and straight-line, man-made appearance.	Volume of regraded material per linear foot of pile perimeter to be specified in approved reclamation plan and/or reclamation estimates.	The County and BLM will inspect regraded areas prior to release of financial assurance for regrading activities.
9. Construction of buildings and structures shall be in accordance with the Uniform Building Code and applicable County ordinances.	Canyon	Reduces potential effect of ground motion from earthquakes.	Buildings and structures shall meet or exceed regulatory standards.	County building department will review building and building-related grading plans to assure compliance.
10. Facility designs and operations shall comply with RWQCB requirements for seismic stability.	Canyon	Requires that facility design considers potential for earthquake-induced ground motion.	California Code of Regulations (CCR) Title 23, Chapter 15 and other RWQCB requirements shall be adhered to.	RWQCB will review final design of processing components prior to construction or expansion of individual facilities. RWQCB will perform routine inspections of site operations.

(1) Includes regulatory requirements that specifically limit project impacts.

2.0 MITIGATION MONITORING PLAN
(Continued)

MITIGATION MEASURES[1]	IMPLEMENTATION RESPONSIBILITY	EFFECTIVENESS	STANDARD OF COMPLIANCE	MONITORING
Topography, Geology, and Soils (Cont'd)				
11. As proposed by Canyon, the leach pad and other processing facilities shall be located 100 feet or more from known fault traces.	Canyon	Provides protection from potential surface rupture due to earthquakes.	100-foot setback.	Final designs for processing facilities and as-built configurations will be reviewed by RWQCB.
12. An earthquake contingency plan shall be maintained throughout the operational period of the project that would allow cyanide within the heap leach pad and solution ponds to be neutralized if containment integrity becomes jeopardized.	Canyon	Enables cyanide solution to be neutralized on short-term notice in the event of an earthquake-induced breach in the integrity of the leach pad or solution ponds.	Plan shall be submitted to RWQCB, BLM and the County prior to introducing cyanide to the processing circuit.	Required materials and equipment and/or documentation of their availability to be maintained onsite for agency inspection upon request.
13. Mine pit slopes shall be evaluated throughout operations, so that excavation occurs at a slope angle that is safe, considering actual rock strength and structural conditions encountered. Benches shall be provided to catch loose rocks.	Canyon	Provides for slopes that are stable against substantial movement.	When mining is completed, Canyon shall provide the County and BLM with engineering data documenting pit slope stability. Pit slopes shall not cause a stability hazard to the public that exceeds natural conditions in the site vicinity.	The County and BLM will review pit wall stability prior to release of financial assurance.
14. Soil suitable for use as growth media shall be salvaged from areas to be disturbed in accordance with the approved reclamation plan.	Canyon	Minimizes loss of topsoil and provides suitable growth media for revegetation.	Soil salvage shall follow guidelines presented in Table 9-4 of the November 1993 Plan of Operations. These guidelines shall also be incorporated into the approved reclamation plan. Variations from these guidelines, if any, shall be approved by the County and BLM.	Estimates of surface disturbance by soil type, volume of soil salvaged, location of stockpiles and stockpile stabilization measures shall be provided to BLM and the County annually in a written report.
15. Growth media stockpiles shall be stabilized by planting and mulching or by chemical stabilization, as necessary.	Canyon	Stabilizes stockpiles against erosion by wind or water.	Chemical stabilization to be implemented if vegetation is not established within two growing seasons.	BLM will monitor by quarterly site inspection.
16. Soils at areas subject to minimal disturbance (e.g., well field area) shall be left in place and stabilized, as necessary.	Canyon	Minimizes disturbance in affected areas.	Reseeding of affected areas to occur prior to the first growing season following stabilization (e.g., final grading) of disturbance.	BLM will monitor by quarterly site inspection.

MITIGATION MEASURES(1)	IMPLEMENTATION RESPONSIBILITY	EFFECTIVENESS	STANDARD OF COMPLIANCE	MONITORING
Topography, Geology, and Soils (Cont'd)				
17. Soil stockpiles shall be clearly marked by signs on all sides to prevent inadvertent disturbance.	Canyon	Protects soils from accidental removal during mine operations.	Minimum of one sign to be posted for every 200 feet of stockpile perimeter. Signs shall be posted within 30 days of completion of each phase of placement of soil in a stockpile, and shall be maintained until the stockpile is removed for reclamation use.	BLM will monitor by quarterly site inspection.
18. Records of the age of stockpiled growth media shall be maintained, and growth media shall be managed to minimize the amount of material stored over two years. Measures shall be taken to restore biological potency of stored growth media, to the extent practical.	Canyon	Reduces loss of biological potency of stored growth media.	Records of the age of stockpiled growth media shall be maintained onsite. Details for restoring biological potency of stored material shall be included in the approved reclamation plan.	Measures taken to minimize the time growth media is stockpiled and to restore biological potency of stockpiled material shall be discussed in annual written reports submitted to BLM and the County.
19. Stabilization measures shall be incorporated into the site drainage system design and construction where required to control erosion. Site drainages would be inspected periodically during operations to assure that excessive erosion is not occurring.	Canyon	Minimizes erosion and loss of topsoil through measures such as rip-rap and water bars.	Site drainage to be certified by a California registered civil engineer. Written certification to be maintained onsite indicating that standard engineering measures for erosion control are provided where necessary. Records of routine inspections of drainage facilities shall be maintained at the site and shall include, at a minimum: (1) name of inspector; (2) date and time of inspection; and (3) observations made. Inspections shall occur at least annually and whenever surface flow from Redlands Canyon occurs. Any excessive erosion shall be reported to BLM in writing within three working days (excluding weekends) and corrective measures shall be implemented within 15 working days, unless otherwise approved by BLM.	BLM will monitor by quarterly site inspection.

(1) Includes regulatory requirements that specifically limit project impacts.

2.0 MITIGATION MONITORING PLAN
(Continued)

MITIGATION MEASURES[1]	IMPLEMENTATION RESPONSIBILITY	EFFECTIVENESS	STANDARD OF COMPLIANCE	MONITORING
Topography, Geology, and Soils (Cont'd)				
20. Areas disturbed during site construction that would not be subject to additional disturbance for three years or more would be seeded prior to first growing season.	Canyon	Reduces erosion from wind or rain events.	Seeding to occur in affected areas prior to the first growing season after stabilization (e.g., final grading) using the seed mix and planting procedures specified in the approved reclamation plan.	BLM will monitor by site inspection.
21. Surfactants shall be used as part of the dust control programs to reduce the amount of high total dissolved solids (TDS) water applied to site roads.	Canyon	Reduces application of high TDS water to road base.	Surfactant shall be used on roads where routine hauling of mined material will occur for a period of six months or more.	Canyon shall report use of surfactants (total quantity, and location and frequency of application) to BLM in an annual report.
Water Resources				
1. The drip irrigation method shall be employed to most of the heap leach surface for normal operations to reduce evaporation.	Canyon	Reduces evaporation, thereby minimizing total water requirements, compared to the more conventional spray application technique.	BLM shall be notified within one working day if sprays are used at locations other than pile slopes. Sprinkler application may occur on leach pile slopes and, if necessary for short-term water balance adjustments on the pile tops (e.g., to evaporate water after a large rain so that adequate emergency pond capacity is maintained).	BLM will monitor by quarterly site inspection.
2. Except for the detoxification pond, which will normally be dry, process water ponds shall be fitted with floating covers.	Canyon	Minimizes water loss while providing wildlife control at ponds.	BLM shall be notified within one working day if any pond cover is removed (e.g., for maintenance or repair).	BLM will monitor by quarterly site inspection.
3. Surfactants shall be used as part of the dust control program, which would reduce water consumption.	Canyon	Reduces water consumption.	Surfactant shall be used on roads where routine hauling of mined material will occur for a period of six months or more.	Canyon shall report use of surfactants (total quantity, and location and frequency of application) to BLM in an annual report.
4. Construction of the diversion for Redlands Canyon shall be approved by the U.S. Army Corps of Engineers (COE) and California Department of Fish and Game (DFG).	Canyon	Reviews are focused toward minimizing disturbance to resources.	As-built configuration of diversion shall conform to design approved by COE and DFG, and stipulations imposed, if any.	As-built configuration to be provided to COE.

MITIGATION MEASURES[1]	IMPLEMENTATION RESPONSIBILITY	EFFECTIVENESS	STANDARD OF COMPLIANCE	MONITORING
Water Resources (Cont'd)				
5. Measures necessary to control erosion would be implemented, including:	Canyon	Minimizes erosion and related effects to surface water during project construction, operation, and reclamation.		
• Minimizing surface disturbance.			• Surface disturbance shall occur only to the extent required for safe and efficient operations. Disturbance shall not occur more than one year prior to scheduled used of any given area.	• Acreages disturbed and reclaimed shall be provided to the County and BLM in an annual report. BLM will monitor by quarterly site inspections. the County will monitor by annual inspections.
• Standard engineering measures such as stabilized drainage ways, riprap and water bars.			• Site drainage shall be certified by a California registered civil engineer. Written certification to be maintained onsite indicating that standard engineering measure for erosion control are provided where necessary.	• Copy of engineer certification to be provided to BLM or the County upon request.
• Reclamation of disturbed surfaces, as soon as practical.			• Areas disturbed shall be reviewed by Canyon annually. Areas that will not be subject to additional disturbance for three years or more shall be stabilized (e.g., graded), as necessary, and then seeded prior to the first growing season following this determination.	• Acreages disturbed and reclaimed shall be provided to the County and BLM in an annual report. BLM will monitor by quarterly site inspections. The County will monitor by annual inspections.
• Inspection and maintenance of site roads and drainage facilities after rainfall events resulting in surface flow.			• Site drainage facilities and roads to be inspected at least annually and after each rainfall event resulting in surface flow from Redlands Canyon. Any excessive erosion shall be reported to BLM in writing within three working days and corrective measures shall be implemented within 15 working days, unless otherwise approved by BLM.	• BLM will monitor by quarterly site inspection.
• Directing drainage away from the slopes of waste rock piles.			• Waste rock pile tops to be sloped away from piles edges.	• BLM will monitor by quarterly site inspection.

(1) Includes regulatory requirements that specifically limit project impacts.

2.0 MITIGATION MONITORING PLAN
(Continued)

MITIGATION MEASURES(1)	IMPLEMENTATION RESPONSIBILITY	EFFECTIVENESS	STANDARD OF COMPLIANCE	MONITORING
Water Resources (Cont'd)				
• Stockpiling and seeding of salvaged soil away from areas of concentrated drainage.			• Soil stockpiles to be placed approximately as shown in the preliminary site layout provided in the EIS/EIR, or as otherwise approved by BLM.	• BLM will monitor by quarterly site inspection.
6. Facilities and procedures for containment of processing liquids shall comply with RWQCB regulations and requirements including, but not limited to, the following: • Low permeability liner systems for process solution ponds, solution transport ditches and heap leach pad. • Drainage or diversion ditches outside the processing solution area to preclude entry of storm runoff into the system. • Adequate freeboard at the leach pad, solution transport ditches and solution ponds to safely contain storm runoff from within the heap leach system and draindown of solution from the leach pads in the event pumps cannot operate because of a power failure. • A leakage detection monitoring system for the leach pad and ponds. • Regularly prepared reports on monitoring results and the current status of operations. • Neutralization of the heap leach pile and elimination of the solution ponds at the time of abandonment.	Canyon/RWQCB	Minimizes the potential degradation of surface or ground water through contact with processing reagents or solutions.	Facilities and operation shall comply with CCR Title 23, Chapter 15 and Waste Discharge Requirements issued by RWQCB.	RWQCB will implement these requirements through detailed design review and issuance of Waste Discharge Requirements. Compliance will be monitored by the RWQCB through routine site inspections and requisite reporting.

MITIGATION MEASURES[1]	IMPLEMENTATION RESPONSIBILITY	EFFECTIVENESS	STANDARD OF COMPLIANCE	MONITORING
Water Resources (Cont'd)				
7. Exposed portions of processing solution and reagent storage containment facilities shall be routinely inspected for deterioration throughout the operational period of the project.	Canyon	Minimizes the potential for reagents or solutions to directly contact the ground.	Inspection of exposed containment facilities shall occur at least monthly. Written records of inspections shall be maintained including, at a minimum: (1) name of inspector; (2) date and time of inspection; and (3) observations made. Any necessary repairs shall be initiated on a schedule commensurate with the potential for escape of process solution or reagents. Any repair required to prevent imminent leakage shall be reported to BLM within 24 hours if repairs are not initiated within that time.	Records of inspections will be made available for agency review upon request.
8. Areas where toxic processing reagents are stored in bulk or used shall be concrete or lined, with drainage control to contain potential spills.	Canyon	Minimizes potential for reagents to contact/surface or ground water.	Toxic reagents shall not be stored in areas that do not have controlled drainage. For purposes of this mitigation measure, "toxic" materials shall be defined as any material that meets toxicity criteria specified in CCR Title 22, Section 66261 or CFR 261.24.	BLM will monitor by quarterly site inspection.
9. A cyanide destructing compound shall be maintained onsite during operations for use in the event of an environmentally threatening spill. For minor spills, the affected soil could be excavated and placed on the leach pad without detoxification.	Canyon	Minimizes the potential for harmful quantities of cyanide to occur on the ground.	Cyanide-destructing compound (e.g., hydrogen peroxide or sodium hypochlorite) to be maintained onsite at all times.	BLM will monitor by quarterly site inspection.

(1) Includes regulatory requirements that specifically limit project impacts.

2.0 MITIGATION MONITORING PLAN
(Continued)

MITIGATION MEASURES[1]	IMPLEMENTATION RESPONSIBILITY	EFFECTIVENESS	STANDARD OF COMPLIANCE	MONITORING
Water Resources (Cont'd)				
10. Prior to operation startup, a Spill Prevention Control and Countermeasures (SPCC) Plan shall be developed in accordance with 40 CFR Part 112 and California Health and Safety Code Section 25270.5.	Canyon	Minimizes the potential for spills and provides for contingency measures if a spill should occur.	At a minimum, SPCC Plan shall conform with guidelines of 40 CFR Part 112 and shall address the topics outlined in Section 2.2.2.8 of the Draft EIS/EIR.	SPCC Plan shall be available for agency review upon request.
11. Bulk fuel and oil storage tanks shall be located over concrete slabs or low permeability liners. Secondary containment shall be provided for the entire contents of the largest tank, plus adequate freeboard. Truck transfer areas shall be graded to contain potential spills.	Canyon	Minimizes the potential for degradation to result from a fuel spill.	Containment to be provided in accordance with the SPCC Plan.	RWQCB will monitor by routine site inspection.
12. Canyon shall conduct periodic visual inspections for leakage or deterioration at petroleum product tanks, fittings and containment facilities.	Canyon	Provides assurance that normal maintenance needs are not overlooked.	Records of inspections to be maintained in site logs. Any necessary repairs shall be initiated on a schedule commensurate with the potential for escape of product to unlined soils.	Records of inspections to be made available for review by agencies upon request. RWQCB will monitor by routine site inspection.
13. Canyon shall develop and implement a surface water sampling plan for the site.	Canyon	Provides means of early detection of changes in water quality related to mine operations.	Sampling Plan shall conform with RWQCB requirements for issuance of stormwater discharge National Pollutant Discharge Elimination System (NPDES) permit.	RWQCB will monitor by site inspection and evaluation of surface water sampling plan and results.
14. Hazardous waste shall be handled and stored in accordance with applicable regulations and transported offsite to an appropriate facility.	Canyon	Minimizes the potential for hazardous waste generated by project operations to become a threat to local surface or ground water resources.	Site waste handling procedures shall conform with CCR Title 22, the County Hazardous Waste Management Plan, and other applicable laws and regulations.	The County will monitor by site inspection and review of manifests.

MITIGATION MEASURES(1)	IMPLEMENTATION RESPONSIBILITY	EFFECTIVENESS	STANDARD OF COMPLIANCE	MONITORING
Water Resources (Cont'd)				
15. Ground water withdrawal shall be monitored to assure that projected water use rates are not exceeded.	Canyon	Provides assurance that impacts assessed in the EIS/EIR are based on worst-case water withdrawal.	The three-year running average ground water withdrawal rate shall not exceed 400 gallons per minute (gpm). If this rate is exceeded, the County or BLM may require reevaluation of impacts related to ground water withdrawal.	Ground water withdrawal shall be continuously monitored by in-line metering. Totalizer readings shall be recorded by Canyon monthly. Water use shall be reported to BLM and the County in an annual report.
16. If one of the playa borrow locations is used, an approximately 1-foot high clay berm shall be constructed around the excavation to prevent the excavation from draining the adjacent natural playa surface.	Canyon	Prevents a large area of the playa from being drained by the excavation.	Berm shall be constructed within 30 days of completing each phase of borrow activity.	BLM and the County will monitor by site inspection.
Vegetation				
1. Disturbance shall be minimized to that necessary for safe and efficient operation. For construction phases, limits of disturbances shall be clearly marked, and vehicles and equipment shall be confined to the marked areas.	Canyon	Minimizes disturbance to surrounding plant communities. Limits the area of disturbance to what is actually necessary for construction and operations activities.	Disturbance shall not occur in areas that will not be used for site facilities. During construction phases, limits of allowable disturbance shall be delineated with survey flagging in a manner that is readily visible to equipment operators and other construction personnel.	BLM and the County will monitor by site inspection.
2. Suitable growth media shall be salvaged and stockpiled for use in reclamation.	Canyon	Maximizes reuse of existing topsoil and potential for revegetation with the same species that were removed during project development.	See Topography, Geology, and Soils, Item 14 in this table.	See Topography, Geology, and Soils, Item 14 in this table.
3. Reclamation shall emphasize efforts for reestablishment of vegetation species native to the site.	Canyon	Maximizes potential for reestablishment of vegetation types that existed prior to disturbance.	Revegetation procedures and seed mixes shall conform with the approved reclamation plan.	The County and BLM will inspect revegetated areas for conformance with revegetation goals prior to release of financial assurance for revegetation efforts.

(1) Includes regulatory requirements that specifically limit project impacts.

2.0 MITIGATION MONITORING PLAN
(Continued)

MITIGATION MEASURES[1]	IMPLEMENTATION RESPONSIBILITY	EFFECTIVENESS	STANDARD OF COMPLIANCE	MONITORING
Vegetation (Cont'd)				
4. A revegetation research plan shall be implemented as soon as practical following project approval. A detailed plan, including test plot locations, schedule, and revegetation techniques shall be submitted to the County and BLM for approval.	Canyon	Implementation of such plan will provide site-specific experience that will be applied toward optimizing the effectiveness of planned site revegetation procedures.	A draft Revegetation Research Plan shall be submitted to the County and BLM within six months of project construction startup. Canyon shall work diligently with the County and BLM to finalize the plan for approval.	Written reports of test plot results will be provided to BLM and the County annually.
5. Revegetation efforts shall be initiated as soon as practical in areas not subject to additional disturbance.	Canyon	Provides for reestablishment of vegetation at the soonest possible time.	Areas disturbed shall be reviewed by Canyon annually. Areas that will not be subject to additional disturbance for three years or more shall be stabilized (e.g., graded) and seeded prior to the first growing season following this determination.	Acreages disturbed and reclaimed shall be provided to the County and BLM in an annual report. BLM will monitor by quarterly site inspections. The County will monitor by annual inspections.
6. Fencing around the heap leach pile shall remain in place, at the discretion of BLM and County, until vegetation is reestablished.	Canyon	Reduces human or animal disturbance to new vegetation and enhancing reestablishment of vegetative cover.	Fencing shall not be removed until authorized by BLM and the County.	The County and BLM will inspect revegetated areas and will require revegetation efforts and fencing removal to be completed prior to release of financial assurance.
7. Financial assurance shall be posted by Canyon to assure appropriate reclamation efforts are completed, as required by 43 CFR 3809 and California Surface Mining and Reclamation Act (SMARA).	BLM/County	Assures funding for reclamation activities in the event that agency participation is required.	Prior to surface disturbance at the site, Canyon shall provide financial assurance for reclamation in accordance with the County and BLM requirements.	Financial assurance will be held by the County and BLM throughout project operations and reclamation, in an amount proportional to remaining reclamation work.
8. A program to monitor and control noxious weeds shall be implemented, as necessary.	Canyon	Inhibits intrusion and establishment of weedy species that could interfere with successful reestablishment of beneficial vegetation.	Program to be approved by the County and BLM, if either agency requires weed control based on weeds becoming established following surface disturbance.	The County and BLM will inspect the site on a routine basis until reclamation is complete. Canyon will be required to implement a weed control program if weed establishment appears imminent.

MITIGATION MEASURES[1]	IMPLEMENTATION RESPONSIBILITY	EFFECTIVENESS	STANDARD OF COMPLIANCE	MONITORING
Vegetation (Cont'd)				
9. The two small wetland areas where differences in vegetation are discernible from the surrounding area shall be monitored to determine if they are affected by project-related water pumping. Mitigation, if necessary, shall occur in accordance with BLM requirements.	Canyon	Provides assurance that impacts to wetland areas, if any, are considered to determine whether mitigation is required.	Canyon shall submit a detailed plan for wetlands monitoring to BLM and the County prior to startup of commercial operations.	Monitoring records shall be maintained by Canyon and results of monitoring shall be reported to BLM and the County annually.
10. Canyon shall perform offsite mitigation to offset disturbances at the mine site that would not be subject to growth media placement, seedbed preparation and reseeding as part of project reclamation.	BLM/Canyon	Compensates long-term loss of vegetation that would occur due to project implementation.	Offsite location(s) and extent of mitigation to determined in consultation with BLM.	BLM to inspect for completion of offsite reclamation activities.
Wildlife				
1. Wildlife habitat shall be reestablished through reclamation measures discussed for vegetation (above).	Canyon	Reduces long-term impact to wildlife by reestablishing habitat.	See criteria for vegetation.	See monitoring for vegetation.
2. Site reclamation shall include efforts to reestablish habitat similar to that which occurs naturally, including utilization of a seed mix emphasizing native shrubs.	Canyon	Enhances reestablishment of the same wildlife species as at the site prior to disturbance.	Revegetation procedures and seed mixes shall conform with the approved reclamation plan.	The County and BLM will inspect reclaimed areas for conformance with reclamation goals prior to release of financial assurance.
3. Mobile and stationary vehicles, equipment and machinery shall be equipped with mufflers.	Canyon	Reduces wildlife noise exposure.	Mine Safety and Health Administration (MSHA) requirements for mufflers shall be adhered to.	MSHA to monitor by site inspection.

(1) Includes regulatory requirements that specifically limit project impacts.

2.0 MITIGATION MONITORING PLAN
(Continued)

MITIGATION MEASURES[1]	IMPLEMENTATION RESPONSIBILITY	EFFECTIVENESS	STANDARD OF COMPLIANCE	MONITORING
Wildlife (Cont'd)				
4. Floating covers on the make up water, pregnant, barren and emergency ponds shall be used to prevent access by birds and wildlife. The detoxification pond shall normally be dry and shall be netted so that wildlife access is prevented when this pond is used. The pond area shall be surrounded by fencing to discourage access by terrestrial wildlife.	Canyon	Prevents animals from ingesting leaching solution.	Canyon shall notify BLM within one working day if any pond cover is removed (e.g., for repair or maintenance). Notice shall include the length of time ponds are expected to be uncovered. Alternative wildlife protection measures may be required during this time period.	BLM to monitor by quarterly site inspection.
5. An electrified fence shall surround the heap leach pad to discourage entry of large animals.	Canyon	Reduces potential for large animals to access the heap leach pad.	Fencing design details shall be approved by BLM prior to construction. Fence shall be maintained in conformance with approved design, which shall specify: (1) maximum allowable ground clearance; (2) maximum opening sizes; (3) minimum height; (4) electrified components; and (5) minimum and maximum operating voltage.	BLM to monitor by site inspection.
6. Routine distribution of solution on the top of the heap leach pad shall occur using a drip irrigation system to prevent surface ponding.	Canyon	Minimizes attractiveness to birds and small animals.	BLM shall be notified within one working day if solution spray emitters are used at locations other than pile slopes. Sprays may be used on the top of the heap leach pad on occasion, if necessary for short-term water balance adjustments (e.g., to evaporate water after a large rain so that adequate emergency pond capacity is maintained).	BLM to monitor by site inspection.

MITIGATION MEASURES[1]	IMPLEMENTATION RESPONSIBILITY	EFFECTIVENESS	STANDARD OF COMPLIANCE	MONITORING
Wildlife (Cont'd)				
7. Piping shall be used in solution ditches to avoid exposed solution. Other measures such as clean gravel fill (i.e., french drain) or netting shall be used to avoid exposed heap leach process solution at the pile edges.	Canyon	Minimizes attraction to animals that would be drawn to the site by the presence of water.	Routine operations shall not result in exposed processing solution at the edges of the heap leach pile or in solution transport ditches.	BLM to monitor by site inspection.
8. Containers of reagents shall be stored within controlled reagent storage areas or otherwise handled to prevent access by wildlife.	Canyon	Prevents reagents from being accessible to wildlife.	Toxic or hazardous reagents shall not be stored in a manner that allows wildlife exposure.	BLM to monitor by site inspection.
9. As proposed by Canyon, water shall not be extracted from Redlands Spring for the duration of operations.	Canyon	Preserves Redlands Spring as a viable sources of water for bighorn sheep and other local and transitory wildlife. A secondary benefit would be the maintenance of local wildlife species and behavior patterns.	The Briggs Project shall not extract water from Redlands Spring.	No monitoring required.
10. Outdoor lighting for the mine pits or other areas of nighttime activity shall be shielded to reduce fugitive light.	Canyon	Limits direct lighting to the area of activity, thereby reducing the potential attraction for wildlife.	Canyon shall submit a detailed lighting plan for approval by BLM and the County prior to installation of stationary outdoor lighting fixtures.	BLM to monitor nighttime lighting impacts by site inspection.
11. A wildlife education program for employees shall be implemented. Disturbance to Redlands Spring, bighorn sheep, and other wildlife shall be avoided. Employees shall not be allowed to bring dogs or other domestic animals onsite. Employees would not be allowed to bring firearms onsite, except for security personnel.	Canyon	Alerts employees to local wildlife species and their status per regulatory agencies. Would inform them as to Canyon's policy of wildlife preservation.	Canyon shall compile a brief, written wildlife protection policy. Site employees and onsite contractors shall be required to read and sign the policy, and signed copies shall be maintained onsite.	Files shall be made available for agency inspection upon request.

(1) Includes regulatory requirements that specifically limit project impacts.

2.0 MITIGATION MONITORING PLAN
(Continued)

MITIGATION MEASURES[1]	IMPLEMENTATION RESPONSIBILITY	EFFECTIVENESS	STANDARD OF COMPLIANCE	MONITORING
Wildlife (Cont'd)				
12. Project waste shall be properly managed.	Canyon	Eliminates garbage as an attractant to wildlife, as a source of both food and water.	Garbage shall be disposed of in covered containers.	BLM to monitor by site inspection.
13. A program to divert Townsend's big-eared bats to alternate maternity roosts shall be implemented.	Canyon	Preserves existing bat population, but at a different suitable location.	The following procedures shall be followed: • Adits at the site shall be closed (gated or excavated) after inspection indicates that no bats are inside, to force the bats to use alternate roosts. The critical period of mid-April through the end of August shall be avoided. • Canyon shall attempt to locate alternate roosts of the banded bat colony the following spring. • If practical based on land status, access, etc., security gates or other measures shall be provided at the alternate roost sites as required to protect the bats from vandals.	Written report on inspection and closing of site adits shall be provided to the County and BLM within 30 days of these activities. Written report on efforts to locate alternate roost shall be provided to the County and BLM by the fall season following closure of site adits. Bat protection at alternate roost sites, if required, will be inspected by BLM when installation is complete.
14. Overland travel (without grading) shall be used to gain access to the microwave site from the existing road. The access corridor shall be flagged to minimize the disturbed area.	Canyon	Results in surface disturbance for the microwave facility only occurring at the building location.	The microwave facility shall be constructed with no grading outside of the building footprint. The access corridor shall be flagged prior to initiating construction at the microwave site.	BLM to monitor by site inspection.
15. The microwave station shall not utilize external lighting.	Canyon	Prevents wildlife from being attracted to the microwave station at night.	There shall be no stationary lighting fixtures on the exterior of the microwave station.	BLM to monitor by site inspection.
16. Speed limits shall be posted on Ballarat and Wingate roads to encourage travel at safe speeds. Cost and maintenance for signs throughout the period of project operations shall be the responsibility of Canyon.	Canyon	Minimizes the possibility that wildlife would be struck by moving vehicles.	A minimum of four speed limit signs shall be posted. Speed limits and signs shall conform with the County requirements.	Canyon shall report to the County annually and indicate speed limit signs are easily visible and in good condition.

MITIGATION MEASURES[1]	IMPLEMENTATION RESPONSIBILITY	EFFECTIVENESS	STANDARD OF COMPLIANCE	MONITORING
Wildlife (Cont'd)				
17. If one of the playa borrow locations is used, an approximately 1-foot high clay berm shall be constructed around the excavation to prevent the excavation from draining the adjacent natural playa surface.	Canyon	Prevents a large area of the playa from being drained by the excavation.	Berm shall be constructed within 30 days of completing each phase of borrow activity.	BLM and the County will monitor by site inspection.
18. If one of the playa borrow locations is used, borrow activities would occur when the natural playa surface in the vicinity of the borrow location is dry.	Canyon	Minimizes potential for borrow activities to affect avian and aquatic wildlife.	Surface water shall not occur within 1,000 feet of active borrow excavation.	Canyon shall notify BLM of the dry status of the borrow vicinity within five working days (excluding weekends and holidays) of beginning each phase of borrow. BLM may monitor by inspection, with the need for inspection determined based upon amount or lack of recent precipitation.
19. Canyon shall perform offsite mitigation to offset disturbed habitat at the mine site that would not be subject to growth media placement, seedbed preparation and reseeding as a part of project reclamation.	BLM/Canyon	Compensates long-term loss of vegetated habitat that would occur due to project implementation.	Offsite location(s) and extent of mitigation to be determined in consultation with BLM.	BLM to inspect for completion of offsite reclamation activities.
Air Quality				
1. Diesel fired generators shall incorporate best available control technology (BACT) for oxides of nitrogen (NO_x) control.	Canyon	Reduces omissions of NO_x from diesel-fired generators by about 43 percent.	Operations and equipment shall conform with Air Pollution Control District (APCD) requirements.	APCD will require proof of compliance prior to issuance of permits to operate, and will inspect the site periodically.
2. A baghouse shall be used on secondary and tertiary crushers, screens, and the lime silo to control particulate matter (PM_{10}).	Canyon	Meets the requirements of New Source Performance Standards, Subpart LL, and APCD Rule 404-A by reducing PM_{10} emissions by 99 percent.	Operations and equipment shall conform with APCD requirements.	APCD will require proof of compliance prior to issuance of permits to operate, and will inspect the site periodically.
3. The portable conveyors for transporting ore between the crushing circuit and the heap leach shall utilize water sprays for PM_{10} control.	Canyon	Reduces PM_{10} emissions associated with ore conveyance by 80 percent.	Operations and equipment shall conform with APCD requirements.	APCD will require proof of compliance prior to issuance of permits to operate, and will inspect the site periodically.

(1) Includes regulatory requirements that specifically limit project impacts.

2.0 MITIGATION MONITORING PLAN
(Continued)

MITIGATION MEASURES[1]	IMPLEMENTATION RESPONSIBILITY	EFFECTIVENESS	STANDARD OF COMPLIANCE	MONITORING
Air Quality (Cont'd)				
4. The doré furnace shall be equipped with a wet scrubber.	Canyon	Reduces PM_{10} emissions by 90 percent to a level that would meet requirements of New Source Performance Standards Subpart LL and APCD Rule 404-A.	Operations and equipment shall conform with APCD requirements.	APCD will require proof of compliance prior to issuance of permits to operate, and will inspect the site periodically.
5. Fugitive dust emissions from ore hauling and other earth-moving activities shall be controlled with routine application of water and surfactant.	Canyon	Reduces PM_{10} emissions by 92 percent to a level that would meet the requirements of APCD Rule 401.	Fugitive dust shall be controlled in compliance with APCD Rule 401.	APCD will perform routine site inspections.
6. Onsite vehicles shall be maintained on a routine basis to reduce exhaust emissions.	Canyon	Reduces exhaust emissions and promotes fuel efficiency.	Equipment maintenance with potential to affect emissions shall be performed in conformance with manufacturer specifications. Canyon shall maintain records of equipment maintenance.	Canyon would monitor by review of vehicle maintenance records, which would be available for agency inspection upon request.
7. Site roads shall be maintained on a routine basis. Periodic spraying with water and/or use of surfactants shall be implemented in accordance with requirements of the APCD.	Canyon	Reduces fugitive dust and PM_{10} emissions.	Fugitive dust shall be controlled in compliance with APCD Rule 401.	APCD will perform routine site inspections.
8. Fugitive dust emissions from drilling in the pit shall be controlled using a pneumatic flushing and filter system and/or other measures as required by the APCD.	Canyon	Meets the requirements of APCD Rule 401 by reducing PM_{10} emissions by 85 percent.	Fugitive dust shall be controlled in compliance with APCD Rule 401.	APCD will perform routine site inspections.
9. Leaching solution shall be maintained at a pH above 10.	Canyon	A pH greater than 10 minimizes volatilization of hydrogen cyanide (HCN) gas.	Processing solution pH shall be maintained above 10. HCN emissions shall be monitored in accordance with MSHA requirements and maintained below MSHA standards.	Canyon to monitor by regular sampling. MSHA will perform routine site inspections.

(Continued)

MITIGATION MEASURES[1]	IMPLEMENTATION RESPONSIBILITY	EFFECTIVENESS	STANDARD OF COMPLIANCE	MONITORING
Air Quality (Cont'd)				
10. Process water ponds containing cyanide shall be covered.	Canyon	Eliminates emissions of HCN from the pond surfaces.	BLM shall be notified within one working day if any pond cover is removed (e.g., for maintenance or repair).	BLM to monitor by quarterly site inspection.
11. Routine distribution of solution on the top of the heap leach pad shall occur using a drip irrigation system to prevent surface ponding.	Canyon	Reduces fugitive emission of HCN from the leach pad.	BLM shall be notified within one working day if solution spray emitters are used at locations other than pile slopes. Sprays may be used on the top of the heap leach pad on occasion, if necessary for short-term water balance adjustments (e.g., to evaporate water after a large rain so that adequate emergency pond capacity is maintained).	BLM to monitor by site inspection.
Land Use, Recreation and Wilderness				
1. Operations shall be conducted in a manner that conforms with land use plans and policies and minimizes potential land use conflicts.	Canyon	Provides assurance of compliance with BLM and the County land use plans and policies.	Operations shall comply with applicable laws, regulations and standards, and descriptions provided in the EIS/EIR.	Monitoring of operations would occur routinely through inspection by the BLM, the County, and other regulatory agencies such as RWQCB and APCD.

(1) Includes regulatory requirements that specifically limit project impacts.

2.0 MITIGATION MONITORING PLAN
(Continued)

MITIGATION MEASURES[1]	IMPLEMENTATION RESPONSIBILITY	EFFECTIVENESS	STANDARD OF COMPLIANCE	MONITORING
Land Use, Recreation and Wilderness (Cont'd)				
2. Steps shall be taken to protect the integrity of the Manly Peak WSA boundary where it borders the project site. At the onset of project construction, Canyon shall place clearly identifiable markers along the WSA boundary (determined by BLM) where it coincides with the project site. All mining activities and structures shall be confined within the project boundary. In areas where construction of site facilities is planned within 100 feet of the WSA, Canyon shall coordinate construction with BLM, and BLM may require that steps in addition to marking the WSA boundary be taken.	Canyon/BLM	Provides assurance that surface disturbance will not occur within the Manly Peak WSA	Markers delineating the WSA boundary shall be placed within ten working days of construction startup. Markers shall be placed at appropriate intervals, and sized and designed such that the WSA boundary is readily visible for construction and operations workers on the ground in the vicinity of the project boundary. Markers need to be placed on the steep mountainous portion of the site where site facilities will not be located within 100 feet of the WSA. However, limits of disturbance shall be clearly flagged in such areas when work is occurring. BLM shall be notified at least 30 days prior to surface disturbance within 100 feet of the Manly Peak WSA, and measures to protect the WSA shall be approved by BLM.	BLM will monitor by quarterly site inspection.
3. Carry out mitigation measures specified for specific environmental resource categories to minimize effects to WSAs and areas proposed for wilderness or Death Valley National Park under the DPA.	As specified for specific environmental resource categories on this table.	As specified for specific environmental resource categories on this table.	As specified for specific environmental resource categories on this table.	As specified for specific environmental resource categories on this table.
4. Canyon shall perform offsite mitigation to offset long-term multiple use impacts of disturbances that would not be subject to growth media placement, seedbed preparation and reseeding as a part of project reclamation.	BLM/Canyon	Reduces long-term cumulative adverse effects on multiple use of public lands in the region.	Offsite location(s) and extent of mitigation to be determined in consultation with BLM.	BLM to inspect for completion of offsite reclamation activities.

MITIGATION MEASURES[1]	IMPLEMENTATION RESPONSIBILITY	EFFECTIVENESS	STANDARD OF COMPLIANCE	MONITORING
Visual Resources				
1. Surface disturbance shall be minimized to that required for safe and efficient operation. Disturbed areas not planned for future use would be promptly reclaimed.	Canyon	Minimizes visual contrast of vegetation removal and surface disturbance.	See Items 1 and 5 under Vegetation.	See Items 1 and 5 under Vegetation.
2. Buildings and structures shall be painted with nonreflective earthtone colors to blend with the predominant background.	Canyon	Reduces color contrast between structures and surrounding natural features.	The paint color for buildings and structures shall be subject to approval by BLM.	BLM would monitor by site inspection.
3. Dust control measures shall be employed to reduce the potential impact of fugitive dust.	Canyon	Reduces visual impact of fugitive dust in the operations area.	Fugitive dust shall be controlled in compliance with APCD Rule 401.	APCD will monitor by site inspection.
4. Outdoor lighting for mine pits and other areas of nighttime activities shall be shielded and directed downward to reduce fugitive light.	Canyon	Reduces intrusiveness of night lighting.	See Item 10 under Wildlife.	See Item 10 under Wildlife.
5. Buildings, equipment, supplies, piping and debris shall be removed from the site at project completion. Foundations shall be broken and removed from the site or buried in accordance with procedures acceptable to BLM and the County. Underground utilities shall be capped below grade.	Canyon	Removes evidence of man-made materials from the mine site.	Reclamation shall occur in conformance with the approved reclamation plan.	BLM and the County will inspect the site for reclamation completion prior to release of financial assurance.
6. To the extent practical, disturbed areas shall be regraded to blend with the surrounding terrain and revegetated.	Canyon	Restores natural-looking contours to the areas that are graded. The waste rock and heap leach piles and mine pit would remain.	Regrading shall occur in accordance with the approved reclamation plan.	BLM and the County will inspect the site for reclamation completion prior to release of financial assurance.
7. Leach pile slopes shall be graded during reclamation to facilitate revegetation and reduce linear appearance. Potholes and other slope aspect variation also shall be provided.	Canyon	Reduces contrast between natural and human constructed features of the site.	Regrading shall occur in accordance with the approved reclamation plan.	BLM and the County will inspect the site for reclamation completion prior to release of financial assurance.

(1) Includes regulatory requirements that specifically limit project impacts.

2.0 MITIGATION MONITORING PLAN
(Continued)

MITIGATION MEASURES[1]	IMPLEMENTATION RESPONSIBILITY	EFFECTIVENESS	STANDARD OF COMPLIANCE	MONITORING
Visual Resources (Cont'd)				
8. The face of waste rock dumps shall be recontoured to break up straight lines and reduce the man-made appearance. The top of the piles shall be prepared with growth media and seeded for revegetation.	Canyon	Reduces visual contrast between human and natural features, especially after vegetation is established.	Regrading and revegetation shall occur in accordance with the approved reclamation plan.	BLM and the County will inspect the site for reclamation completion prior to release of financial assurance.
9. The final mine pit walls will be stained where required to reduce visual contrast with surrounding areas.	Canyon	Reduces visual impact of the mine pit highwall by eliminating unnatural rock color contrast.	Canyon shall submit a contrast rating system and staining criteria for BLM and County approval early enough in the project operation so that any part of the pit highwall can be practically accessed for staining, if necessary, and as a limit, by the end of the first year of commercial production.	Contrast evaluations and rock staining completed shall be addressed in an annual report to BLM and the County.
Cultural Resources				
1. The Section 106 process shall be completed prior to BLM's Record of Decision and the County's Notice of Determination.	BLM	Provides for appropriate treatment of cultural sites CA-INY-4643 and CA-INY-4644.	Treatment of cultural resources shall comply with requirements of the State Historic Preservation Officer (SHPO), and the National Historic Preservation Act (NHPA).	BLM will conduct the Section 106 process.
2. Sites CA-INY-4643 and CA-INY-4644 shall be fenced to preclude unintentional trespass or disturbance of the resources during mine development and operation.	Canyon	Protects site from trespass, grading or other disturbance.	Treatment of cultural resources shall comply with requirements of the SHPO, and the NHPA.	BLM to monitor by site inspection.
3. Sites CA-INY-4643 and CA-INY-4644 shall be monitored on a semiannual basis.	Canyon	Provides assurance that any unanticipated impacts are identified promptly so that additional mitigation can be implemented, if necessary.	Monitoring to be performed approximately every six months by a qualified archaeologist.	Reports of inspections to be submitted to BLM.

MITIGATION MEASURES[1]	IMPLEMENTATION RESPONSIBILITY	EFFECTIVENESS	STANDARD OF COMPLIANCE	MONITORING
Cultural Resources (Cont'd)				
4. Canyon shall provide instruction to construction and operations personnel regarding the sensitivity of cultural resources and the presence of laws against unauthorized collection or disturbance. Appropriate personnel shall be instructed that surface disturbance must cease immediately in any area where an unknown cultural resource is discovered.	Canyon	Discourages unauthorized artifact collection and prevents unintentional disturbance to resources that have not been discovered but may be present within the area to be developed for the mine.	Canyon shall compile a brief written cultural resource protection policy to be adhered to by site employees and contractors. All employees and onsite contractors shall be required to read and sign the policy, and signed copies shall be maintained onsite.	Files shall be made available for agency inspection upon request.
Transportation				
1. Canyon shall enter into an agreement with the County for maintenance of the Ballarat and Wingate roads.	Canyon	Offsets increased maintenance requirements that could occur as a result of project implementation.	Conditions of the agreement shall be adhered to throughout the construction period and operational life of the project.	County to monitor by site inspection.
2. If one of the offsite borrow locations is used:	Canyon			
• Road watering and surfactants shall be used to alleviate the traffic hazard of reduce visibility due to dust.		• 90 percent dust control is expected	• Road dust shall not create a significant traffic hazard.	• Canyon shall notify BLM and the County prior to initiating each phase of borrow, and BLM or the County may monitor by inspection.
• Signs would be posted to alert other road users of hauling activities.		• Alerts other road users to potential traffic hazard, encouraging use of appropriate caution.	• A sign plan shall be submitted to and approved by BLM and the County prior to initiating offsite borrow activities.	• BLM and the County may monitor by inspection.
• A speed limit of 25 miles per hour shall be established for haul traffic.		• Provides assurance that haul traffic will not travel at unsafe speeds.	• Canyon shall obtain a signed statement from all haul traffic drivers indicating that they are aware of the speed limit.	• Signed statements to be made available for inspection upon request.
• A road grader shall be available full time during the hauling operation and the road surface shall be kept in good condition.		• Will provide assurance that road surface is maintained in good condition for travel by other vehicles.	• Road shall be maintained in a condition suitable for uninhibited travel by normal two-wheel drive passenger vehicles.	• BLM and the County may monitor by inspection.

(1) Includes regulatory requirements that specifically limit project impacts.

2.0 MITIGATION MONITORING PLAN
(Continued)

MITIGATION MEASURES[1]	IMPLEMENTATION RESPONSIBILITY	EFFECTIVENESS	STANDARD OF COMPLIANCE	MONITORING
Transportation (Cont'd)				
• If the south borrow area is used, flaggers would be stationed on Wingate Road north and south of the construction travel zone.		• Alerts road users of potential hazard, encouraging use of appropriate caution.	• Flaggers to be present during all periods that haul traffic may occur.	• BLM and the County may monitor by inspection.
Noise				
1. Machinery, equipment and vehicles shall be equipped with mufflers, as appropriate.	Canyon	Reduces noise to the extent practical.	MSHA requirements for mufflers shall be adhered to.	MSHA to monitor by site inspection.
2. Blasting shall be engineered to minimize explosive use while obtaining desired results.	Canyon	Prevents unnecessary noise due to blasting.	Canyon shall, throughout the entire course of mine pit excavation, employ a qualified employee to direct the use of explosives at the site. Records of the type and quantity of explosives used and tonnage of rock moved shall also be maintained.	BLM to monitor by inspection. Site records shall be made available for inspection upon request.
3. Blasting shall occur only during daylight hours.	Canyon	Eliminates blasting during night hours and confines blasting to times where atmospheric conditions are more prone to attenuate noise.	Routine blasting shall occur between the hours of 7 a.m. and 5 p.m. Any planned blasting after dark must be approved in advance by BLM and the County.	Blast times shall be noted in daily site logs, which shall be made available for inspection by BLM or the County upon request.
Socioeconomics				
1. To the extent feasible, Canyon shall hire construction and operations personnel from the local labor force.	Canyon	Minimizes the amount of new population in the area.	Canyon shall take practical measures to attempt to obtain required personnel from the local area in so far as it is not inconsistent with antidiscrimination laws. The local area shall be defined as China Lake/Ridgecrest, Trona/Argus, Lone Pine, Independence and surrounding rural areas. At a minimum, these measures shall include: (1) providing notice of employment opportunities through local media (newspapers and radio); (2) holding interviews in the local area.	Employment statistics shall be provided to the County and BLM in an annual report. Statistics shall identify the total number and percentage of staff that are from the local area. If the number of locally hired operations personnel is less than 60 percent of the mine employees, techniques utilized to attempt local recruitment shall also be provided in the report.

MITIGATION MEASURES[1]	IMPLEMENTATION RESPONSIBILITY	EFFECTIVENESS	STANDARD OF COMPLIANCE	MONITORING
Socioeconomics (Cont'd)				
2. Property taxes from the proposed action shall be assessed consistent with applicable tax codes.	County	Provides revenues to support County infrastructure.	Standard taxes and fees shall apply.	Monitoring not required.
Environmental Health and Safety				
1. Heap leach pad and process ponds liners shall be designed in accordance with RWQCB requirements to prevent the release of solution and contain storm precipitation and runoff.	Canyon	Minimizes potential for processing solution to mix with surface water.	Prior to impoundment of processing solution, a California registered civil engineer shall certify that liner systems have been constructed in accordance with designs approved by the RWQCB.	RWQCB to monitor by site inspection prior to impoundment of processing solution and prior to loading of ore onto the leach pad.
2. Final rinsing of leached ore shall occur in accordance with RWQCB requirements prior to the ore pile being decommissioned.	Canyon	Minimizes potential for residual processing solution to remain in ore pile, where it would be a potential hazard to humans and animals that might come into contact with the residual solution.	Prior to abandonment of the ore heap, rinsing of spent ore and testing of residual reagent concentrations shall conform with requirements specified in the Waste Discharge Order issued by RWQCB.	Prior to abandonment of the heap leach pad, Canyon shall provide a written report to the RWQCB detailing rinsing procedures and spent ore chemistry as compared to abandonment requirements of the Waste Discharge Order. RWQCB may opt to perform a pre-abandonment inspection.
3. Drainage diversions shall be constructed to protect the processing area from run-on. These diversion structures shall be designed for the 100-year storm.	Canyon	Minimizes potential for surface water to run on to the processing-solution circuit and result in overflow.	Drainage controls for the processing area shall be designed and certified by a California registered civil engineer. The certification shall specify that the required design conditions are met.	Certification of the processing solution circuit shall be provided to RWQCB. RWQCB to monitor by site inspection.
4. The heap leach and gold recovery process shall be a zero-discharge system to contain processing solutions in a controlled environment. The system shall include the capacity to contain precipitation that could fall onto the processing components as a result of the 100-year storm, plus draindown from the heap leach pile in the event of a 24-hour power outage.	Canyon	Minimizes opportunity for processing solutions to flow into an area that could affect health and safety.	The processing solution containment system shall be designed and certified by a California registered civil engineer. The certification shall specify that the required design conditions are met.	Certification of the processing-solution circuit shall be provided to RWQCB. RWQCB to monitor by site inspection.

(1) Includes regulatory requirements that specifically limit project impacts.

2.0 MITIGATION MONITORING PLAN
(Continued)

MITIGATION MEASURES[1]	IMPLEMENTATION RESPONSIBILITY	EFFECTIVENESS	STANDARD OF COMPLIANCE	MONITORING
Environmental Health and Safety (Cont'd)				
5. A regular maintenance program for access roads to the site shall be implemented. Speed limits shall be posted on Ballarat and Wingate roads.	Canyon	Provides for vehicular safety and minimizes the potential for a traffic accident on the site access road.	Maintenance and sign requirements shall be defined in the road maintenance agreement and adhered to throughout project construction and operations.	County to monitor by site inspection.
6. Areas where toxic solutions will be used shall be designed with dikes or curbs to contain potential spills. For purposes of this mitigation measure, "toxic" materials shall be defined as any material that meets toxicity criteria specified in CCR Title 22, Section 66261 or 40 CFR 261.24.	Canyon	Minimizes potential for toxic solutions to contact surface or ground water, a potential health hazard.	Areas where toxic solutions will be used shall have secondary containment designed by a California registered civic engineer. Designs shall be reviewed and approved by RWQCB.	RWQCB to monitor by site inspection.
7. Waste materials generated onsite shall be disposed at approved facilities. Any hazardous wastes shall be stored in accordance with state and federal regulations and disposed offsite at an appropriately licensed facility.	Canyon	Minimizes the potential for humans to come into contact with hazardous or nonhazardous wastes, either of which could be detrimental to health and safety.	All waste handling shall conform to federal, state and local laws, regulations and requirements.	BLM, RWQCB and the County to monitor by site inspection.
8. Site operations shall be conducted in compliance with MSHA regulations.	Canyon	Safety procedures and equipment minimize hazards to workers and visitors.	Operations shall occur in accordance with MSHA regulations.	MSHA would monitor by site inspection.
9. Storage and use of explosives shall comply with federal regulations.	Canyon	Controls explosives storage and use.	Explosives storage and use to occur in accordance with 27 CFR Part 55.	MSHA to monitor by site inspection.
10. Canyon shall encourage compliance with state and federal regulations during transportation of materials to the site.	Canyon	Encourages adherence to requirements regarding driver qualifications, materials, containment and transport vehicles, thereby providing protection for public health and safety.	Canyon shall specify in purchasing contracts that applicable transportation laws and regulations shall be adhered to for deliveries to the site.	Canyon shall make purchasing contracts with requisite language available for inspection by BLM or the County upon request.

(Continued)

MITIGATION MEASURES[1]	IMPLEMENTATION RESPONSIBILITY	EFFECTIVENESS	STANDARD OF COMPLIANCE	MONITORING
Environmental Health and Safety (Cont'd)				
11. Fences shall be erected around potentially hazardous areas to discourage entry by unauthorized personnel or visitors.	Canyon	Minimizes access to hazardous areas and maximizes safety of employees and visitors unfamiliar with mine operations.	At a minimum, fencing shall be provided at the heap leach pile, solution pond, and reagent storage and use areas. A gate shall be provided at the entrance to the site across road.	BLM to monitor by site inspection.
12. A designated emergency medical treatment (EMT) vehicle shall be provided onsite for emergency response. First aid equipment shall be provided at appropriate locations.	Canyon	Provides immediate emergency response in the event of a mishap.	EMT vehicle shall be provided and maintained onsite. At least two first aid kits shall also be maintained onsite. First aid kits shall include standard materials (bandages, splints, etc.) and cyanide poisoning treatment materials and equipment (e.g., oxygen respirators, cyanide antidote, etc.).	MSHA to monitor by site inspection.

(1) Includes regulatory requirements that specifically limit project impacts.

APPENDIX G
BIGHORN SHEEP MONITORING PLAN

APPENDIX G.1

BIGHORN SHEEP IMPACT MONITORING PLAN

~~RESEARCH PLAN~~

~~PANAMINT MOUNTAINS BIGHORN SHEEP PROJECT~~

BIGHORN SHEEP IMPACT MONITORING PLAN

JUSTIFICATION

1. This research plan has been developed in response to a request to construct an open pit cyanide heap leach gold mine at Redlands Canyon, located in the southern Panamint Mountains. Other major mining operations in nearby canyons are also likely to be proposed over the next several years.

2. The southern Panamint, and Redlands Canyon in particular, support a population of bighorn sheep of unknown size. Although no definitive study of this sheep population has been attempted, anecdotal accounts of sheep use are well documented.

3. Human-related disturbances have played a major role in reducing or eliminating bighorn sheep herds. Actions that have the potential for changing sheep activity patterns or altering established habitat utilization patterns have already occurred, or are projected to occur in and around Redlands Canyon and in the major canyons in the southern Panamint over the next decade. These activities may have already impacted traditional watering sources and bighorn use patterns, particularly in Goler Wash and Pleasant Canyon. Redlands Spring is the last remaining water source used by bighorn in the southern Panamint that does not have a road or human disturbance associated with it.

4. Studies conducted in desert ranges of California indicate that intermountain movement of bighorn sheep occurs with more regularity than was previously believed. Relatively small sheep populations may rely on intermountain movements for genetic exchange and to maintain genetic diversity. These mountain ranges may contain important seasonal habitat, such as water sources, lambing areas, and movement corridors which are vital to the survival of the population. Loss of a particular segment of the population may seriously jeopardize the continued existence of the population in that mountain range, and may also seriously affect the viability of the metapopulation.

5. The opportunity now exists to examine the cumulative effects of mining activity on bighorn sheep habitat use and demography.

6. An initial phase to gather baseline data is necessary to establish the existing conditions within the study area, in order to have reference with which to compare habitat use and movement patterns after mining begins.

7. Additional animals outside of the immediate Redlands Canyon area will also be included as part of the Redlands Canyon bighorn sheep study. The inclusion of these animals into the research study is necessary for two reasons. First, these animals are not expected to be subjected to the potential disturbances which are associated with mining activity, and therefore, will function as a control group for the Redlands Canyon population. Secondly, the information which is gathered on these other areas may be utilized as the baseline data for other development projects which may be proposed for the Panamint in the future.

8. Bighorn sheep research in the study area will be conducted in two phases, where Phase I is designed to study bighorn sheep biology, and Phase II is intended to study the affects of the mining activity on the sheep. Monitoring will be conducted with the aid of a variety of research techniques.

RESEARCH GOALS (PHASE I)

Define population and habitat within study area (minimum two years).

OBJECTIVES

1. Provide an empirical estimate of the number of bighorn sheep within the study area on a seasonal basis. The proposed study area is bounded by Goler Wash on the south, Panamint Valley floor on the west, Surprise Canyon on the north, and the Panamint Range ridgeline on the east.

2. Describe population demography: ram:ewe and lamb:ewe ratios, lamb recruitment, and sources of mortality.

3. Determine location and relative importance of movement corridors found within the study area. Determine if sheep have a high level of fidelity for Redlands Canyon.

4. Determine physical and biotic attributes of the study area. Investigate habitat selection by sheep. Evaluate spatial and temporal use of habitat.

5. Determine preproject home ranges of individual animals.

6. Determine the relationship between habitat use areas, movement corridors, and the project facilities.

7. Obtain baseline physiological data in order to document disease and stress factors which may already be present in the population.

8. Design and implement mitigation measures to reduce the effects of construction and operations activities, if the research study reveals that mining operations are having a negative impact on the local sheep.

RESEARCH GOALS (PHASE II)

1. Monitor the effects of mining on population dynamics in the Redlands Canyon area, and monitor the effectiveness of mitigation measures implemented from No. 8 above (throughout life of mine project and reclamation).

OBJECTIVES

1. Continue to update estimate on number of animals within the study area.

2. Monitor to determine if demographic changes occur.

3. Monitor to determine if changes occur in temporal use of habitat occur.

4. Monitor to determine if changes occur in timing or use of movement corridors.

5. Monitor to determine if changes in home ranges of animals occur.

6. Monitor physiological status of marked animals. Chronic stress will be monitored through fecal cortisol analysis.

7. If changes in any of the above attributes are noted, describe and evaluate the causative factors which may be driving these changes.

8. Revise mitigation measures, if necessary, and continue monitoring to determine effectiveness. Establish interagency steering committee (BLM, DFG, NPS, contractor, industry) to evaluate data collected and revise mitigation measures, if necessary.

RESEARCH METHODOLOGY

1. Radio collars will be placed on at least 25 percent of the population (15 minimum). Initially, half of the collars will be placed on animals in the immediate Redlands Canyon area, and half will be placed on animals in adjacent canyons. The ratio of sexes collared will be established to facilitate demographic structural analysis. The primary method of capture will utilize a hand-held net gun fired from a helicopter.

2. Upon initial capture, blood and tonsilar swabs will be collected and analyzed for P13, pneumonia, EHD, blue-tongue and scabies. Based on the results from the initial tests, a schedule for rechecking animals on a periodic basis will be developed to determine if the epidemiological condition of the animals changes during mining activities. Fecal cortisol will be analyzed on a monthly basis in an effort to determine physiological stress levels.

3. Monitoring of the radio collars will be conducted weekly utilizing fixed-wing aircraft. Low level flights will not be undertaken during lambing season.

4. Automated video cameras will be placed at Redlands Spring, Colter Spring, Surprise Canyon, and other appropriate water sources to monitor sheep use. Cameras will be checked every 10 to 14 days to assure full-time coverage.

5. Habitat will be modeled using a GIS. Slope modeling will be performed using the most detailed scale possible. The model will include an analysis of water distribution, vegetation type, slope, and surface roughness. The model will be ground-truthed, and the degree of visual obstruction for the local area will be determined through ground truthing.

6. Exploration and mining activities within the study area will be monitored using Notice of Intent documents, company logs, etc.

APPENDIX G.2

LETTER FROM DEATH VALLEY NATIONAL MONUMENT

United States Department of the Interior

NATIONAL PARK SERVICE
DEATH VALLEY NATIONAL MONUMENT
DEATH VALLEY, CALIFORNIA 92328

IN REPLY REFER TO:
L76 (Briggs Project)

November 18, 1993

Lee Delaney, Area Manager
Bureau of Land Management
300 S. Richmond Rd.
Ridgecrest, CA 93555

Dear Lee:

Jeff Aardahl and members of his staff have met with staff from your office, the County of Inyo and Canyon Resources on a number of occasions as part of the environmental review process for the proposed Briggs Project in the southern Panamint Mountains. We very much appreciate being able to participate as a cooperating agency.

Recently we met in your office with members of the BLM and California Department of Fish and Game (Bishop office) to address concerns over the potential affect on bighorn sheep in the southern Panamint Mountains posed by the Briggs Project. As we discussed this concern it became clear that we needed to consider not only the Briggs Project, but current and projected human uses in this mountain range that could have an adverse impact on bighorn. Lynn Gumm of your staff provided insight into the potential for mining development in the Panamint Mountains from the Jackpot Canyon area south to Goler Wash. The National Park Service has an interest in this activity because maintaining healthy herds of bighorn in the Panamint Mountains as a whole can only be accomplished by managing the range as a cohesive unit.

Our concerns with respect to the long-term integrity of the southern Panamint Mountain bighorn sheep population is based on the following information:

Documentation Of Historical Bighorn Sheep Activity In And Around Redlands Canyon

While no definitive study of the Panamint Mountain sheep population has been attempted, a variety of cursory investigations have documented the fact that sheep use the area around Redlands Spring (Welles and Welles 1961, Hansen 1972, Weaver 1972, Weaver 1992). In addition, anecdotal accounts have also documented the presence of sheep in the immediate vicinity of Redlands Spring on numerous occasions in the last ten years (Pat Brown-Berry pers. comm., Douglas Threloff pers. comm., Matt Wohlberg pers. comm.), while another source reports that as many as 40 sheep were watering near the caretakers cabin a mile west of the spring in the early 1980's (Frenchy Bedard

pers. comm.). Based on this information, it is clear that at least some portion of the Panamint Mountain herd occupies habitat in and around Redlands Spring on a permanent and/or regular basis.

Quality And Value Of Habitat In And Around Redlands Canyon

Enclosed is a GIS-developed map showing the southern Panamint Mountains from Goler Wash north to Middle Park Canyon as well as lands in adjacent Death Valley National Monument. This map has been developed in order to assess the value of the land around Redlands Canyon as it relates to bighorn sheep. Features shown include springs (green + marks), roads, and the approximate extent of bighorn sheep escape terrain (red zones).

A sheep study currently underway in the Monument indicates that sheep prefer tracts which have escape terrain (32 degree+ slopes) in close proximity to foraging areas (11-31 degree slopes). Based on this habitat utilization, it is apparent that the type of topography that the sheep prefer in the Black Mountains is also present between South Park Canyon and Goler Wash.

The value of water at Redlands Spring during the summer months is also significant, since this resource is believed to be the single most limiting factor of desert bighorn populations (Turner and Weaver 1980). The value of this permanent water source is magnified considering the next nearest water source is over four miles away.

Based on two bighorn habitat evaluation models which have been developed in the Mojave Desert (Hansen 1967, Ferrier and Bradley 1970) it appears that if the local area were classified according to habitat parameters which included local topography and the presence of permanent water, portions of the Redlands Canyon area would be considered to be of moderate to high value for bighorn. This conclusion was further substantiated after Richard Weaver, a retired California Department of Fish and Game employee and noted bighorn biologist, conducted a survey for Canyon Resources around the Redlands Canyon area in 1992 (Weaver 1992). In his opinion, the area around Redlands Canyon would be considered vital to bighorn sheep, while slopes above 3000 feet would be considered to be important.

Impact Of Human-related Disturbances on Bighorn Sheep Populations

The fact that human-related disturbances have played a major role in affecting, reducing or eliminating bighorn sheep herds has been documented by numerous researchers (Dunaway 1971, DeForge 1972, Jorgensen 1974, Wilson 1968, Olech 1978, Hicks and Elder 1979, Leslie and Douglas 1980, Campbell and Remington 1981, Douglas and Kingsley 1981, Hamilton 1982, Gionfriddo and Krausman 1986, King and Workman 1987.)

Activities which have the potential for changing sheep activity patterns or altering habitat utilization practices include construction activities, mining activities, and increased vehicle traffic. All of these activities have already occurred, or are

projected to occur in and around Redlands Canyon and in the major canyons in the southern Panamint Range in the next decade. Almost all of the major canyons in the local area, for example, have roads which facilitate motorized vehicle traffic and thereby have the potential for affecting bighorn sheep behavior or habitat use. Construction and mining activities for the Briggs mining project will involve the excavation of a large mine pit and the construction of a leach pad and waste rock dumps (Environmental Solutions 1993). Blasting at the site will also be required to loosen and fragment waste rock and ore.

In some form or fashion, many of these activities have already occurred in Goler Wash, South Park Canyon, and Middle Park Canyon, Pleasant Canyon and Surprise Canyon. They may have already resulted in the impact to traditional watering sources and use by bighorn, particularly in Goler Wash and Pleasant Canyon. The fact that these activities will continue, is demonstrated by a request to conduct exploratory drilling in Pleasant Canyon (Kerr-McGee Company/Echo Bay Exploration Inc. 1993). Evidence from other mining and construction sites suggests that these activities may likewise affect sheep in the southern Panamint Mountains in a negative way.

Cumulative Impacts, And The Need to Manage the Southern Panamint Mountains Sheep Population As A Cohesive Unit

The fact that several activities which probably have had a negative impact on the local bighorn sheep population has been outlined above. Each of these impacts is not catastrophic in itself, but when taken as a whole, probably does have a cumulative effect which could reduce the sheep herd in the Panamint range. With decreasing numbers of animals, genetic exchange with sheep in other mountain ranges is reduced, and inbreeding potential increases (Krausman and Leopold 1986). Both of these in turn accelerate the downward population spiral, and are believed to have in part been causative factors in the elimination of animal populations in other areas (Wilson 1988). The possibility of a similar scenario occurring in the Panamints is not unrealistic given the fact that 45 bighorn sheep populations have been lost in California since the gold rush days of 1849 (Wehausen et. al. 1987).

In addition, our GIS developed habitat model for the southern Panamints suggests that the preferred habitat and movement corridor for bighorn is on the western slope of the range in the Pleasant Canyon to Goler Wash area.

If large-scale mining activities were to begin in several of the canyons along the west slope of the Panamints, it is conceivable that the sheep population could begin a downward trend which could threaten the long-term viability of the Panamint herd. As the two land management agencies which administer lands in the Panamint Mountains, it is crucial that the Bureau of Land Management and National Park Service work jointly together to coordinate management and research actions so that the sheep population is managed with sound biological information and a goal of long-term viability.

Based on this information, we continue to support a monitoring program that will enable our two agencies, the County of Inyo and the Department of Fish and Game to determine the short and long-term effects of mining and related human uses on bighorn sheep in the southern Panamint Mountains. We seek the support of all the agencies interested in this issue as well as the developers (Canyon Resources, etc.).

Also enclosed is a proposal for monitoring the effect of the Briggs Project on bighorn. This could be the beginning of a long-term study that would expand as more development occurs on the western slope of the Panamint Mountains. It is important that we undertake this monitoring program soon because of the proposed implementation schedule for the Briggs Project. Project monitoring to determine the accuracy of impact prediction contained in the EIS is a legitimate component of NEPA compliance for this project and will enable us to better identify impacts associated with future mining plans of operation and other human uses of the area.

Please review the enclosed materials and contact us so that we can form a consensus on an approach to this important issue. Jeff Aardahl of my staff is the key contact. Thanks very much for your assistance.

Sincerely,

for Edwin L. Rothfuss
Superintendent

Enclosures (2)

bcc: Reading (DEVA)
Central Files (DEVA)
CF Reader (DEVA)
RM (DEVA)
SO Reader (DEVA)
RM;DT;nw;:11/15/93;ext.252

Literature Cited

Campbell, B., and R. Remington. 1981. Influence of construction activities on water-use patterns of desert bighorn sheep. Wildl. Soc. Bull. 9(1):63-65.

DeForge, J. R. 1972. Man's invasion into the bighorn's habitat. Desert Bighorn Council Transactions:112-115.

Douglas, C.L., and K.J. Kingsley. 1981. Bighorn Habitat Evaluation and Management Guidelines for the Grapevine Mountains, Death Valley National Monument. National Park Service/University of Nevada, Las Vegas. Number 023/01. 37pp.

Dunaway, D. J. 1971. Bighorn sheep habitat management on the Inyo National Forest, a new approach. Desert Bighorn Council Transactions: 18-23.

Environmental Solutions. 1993. Briggs Project Inyo County, California. Draft Environmental Impact Statement/Environmental Impact Report. State Clearinghouse No. 92122070.

Ferrier, G.J., and W.G. Bradley. 1970. Bighorn habitat evaluation in the Highland Range of southern Nevada. Desert Bighorn Council Transactions: 66-93.

Gionfriddo, J. P., and P. R. Krausman. 1986. Summer habitat use by mountain sheep. J. Wild. Manage. 50(2):331-336.

Hamilton, K. M. 1982. Effects of people on bighorn sheep in the San Gabriel Mountains, California. National Park Service/University of Nevada, Las Vegas. Contribution Number 020/06. 69 pp.

Hansen, C.G. 1967. Classifying bighorn habitat on the Desert National Wildlife Range. Mimeo report, files of Desert National Wildlife Range, Las Vegas, Nev.. 20pp.

Hansen, C.G. 1972. The evaluation of bighorn habitat in Death Valley National Monument. Report to the National Park Service, Death Valley National Monument, Death Valley, CA. 84pp.

Hicks, L. L., and J. M. Elder. 1979. Human disturbance of Sierra Nevada bighorn sheep. J. Wildl. Manage. 43:909-915.

Jorgensen, P. 1974. Vehicle use at a desert bighorn watering area. Desert Bighorn Council Transactions: 18-24.

Kerr-McGee Company/Echo Bay Exploration Inc. 1993. Reclamation Plan #93-1 / Conditional Use Permit #93-10. 18pp.

King, M. M., and G. W. Workman. 1987. Response of desert bighorn sheep to human harassment: management implications. Trans. 51st N. A. Wildl. and Nat. Res. Conf.: 74-85.

Krausman, P.R., and B.D. Leopold. 1986. The importance of small populations of desert bighorn sheep. Transactions of the North American Wildlife and Natural Resources Conference. 51:52-61.

Leslie, D. M., and C. L. Douglas. 1980. Human disturbance at water sources of desert bighorn sheep. Wildl. Soc. Bull. 8(4): 284-290.

Olech, L. A. 1978. The behavior of the Peninsular bighorn sheep, Ovis canadensis cremnobates Elliot, in Anza-Borrego Desert State Park, California. M. S. thesis, San Diego State University.

Turner, J.C., and R.A. Weaver. 1980. Pages 100-112 *in* G.M. Monson and L. Sumner, eds. The Desert Bighorn: Its Life History, Ecology, and Management. The University of Arizona Press, Tucson, Ariz.

Weaver, R.A. 1972. Desert bighorn sheep in Death Valley National Monument and adjacent areas. California Department of Fish and Game Wildlife Administrative Report No. 72-4. 23pp.

Weaver, R.A. 1992. Impact of the proposed Briggs Gold Project on Bighorn Sheep and Bighorn Sheep Habitat. Undated, 1992 Letter.

Wehausen, J.D., V.C. Bleich, and R.A. Weaver. 1987. Mountain sheep in California; a historical perspective on 108 years of full protection. Trans. Western Section of the Wildl. Soc., 23:65-74.

Welles, R.E., and F.B. Welles. 1961. The bighorn of Death Valley. U.S. National Park Service Fauna Ser. No. 6. Washington, D.C. 242pp.

Wilson, E.O., and F.M. Peters, editors. 1988. Biodiversity. National Academy Press, Washington, D.C.

Wilson, L. O. 1968. The distribution, ecology and management of the desert bighorn of southeastern Utah. Utah Div. Wildlife, Salt Lake City, Utah, 68-5. 220pp.

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